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# **Sampling Episode Report Princess Cruise Lines Island Princess Sampling Episode 6505**

## **Chapter 4 Results and Discussion**

**March 2006**

## **4.0 RESULTS AND DISCUSSION**

This section presents the data collected during this sampling episode. Section 4.1 presents the analytical results and discussion; Section 4.2 presents interview results for activities that impact wastewater generation; and Section 4.3 presents flow data and analysis. Analytical results for field measurements performed onboard are presented in Appendix A-3. Note that anomalous analytical results were obtained for available and total cyanide; these data have not been excluded from the data set, but the results are presented in and discussed in Section 5.1.1 (in the data quality section of this report) and not in the current section.

### **4.1 Laboratory Analytical Results and Discussion**

#### **4.1.1 Graywater**

Tables 4-1 through 4-3 present analytical results for galley, laundry, and accommodations wastewater, respectively, which were collected for five consecutive 24-hour sampling periods during the sampling episode. Table 4-4 presents average analytical concentrations for these three graywater sources. Only those analytes detected at least once in any of the wastewater samples (i.e., graywater sources, influent to treatment system, or effluent from treatment system) are included in this table. Appendices A-1 and A-2 present results for both detected and nondetected analytes.

Of the 295 analytes tested for in the graywater sources, 64 were detected in the graywater waste streams. Thirteen of these 64 analytes were also detected at some level in the equipment blank (flagged by an “e” in Tables 4-1 through 4-5; see Table 5-2 for equipment blank results), meaning that the sampling equipment may have contributed some or all of these analytes to the samples. EPA will consider the impact of possible contamination from sampling equipment in a future analysis. Twenty-one of these 64 detected analytes were also detected at some level in the potable water used as source water for all graywater systems (flagged by an “s” in Tables 4-1 through 4-5; see Table 4-12 for source water results), meaning that the source water may have contributed some or all of these analytes to the samples.

Chart 1 presents the number of analytes detected in each graywater source (see Table 4-4).

**Chart 1. Number of Analytes Detected in Graywater Sources**

Analyte Group (a)	Number of Analytes Detected		
	Galley	Laundry	Accommodations
Pathogen Indicators	3	3	3
Classical Pollutants	15	15	15
Total and Dissolved Metals	40	31	34
Volatile and Semivolatile Organics	3	3	2
<b>Total</b>	<b>61</b>	<b>52</b>	<b>54</b>

(a) See Table 3-3 for information on analyte groups.

Chart 2 presents the number of analytes that were detected in each graywater source at the highest average concentration. For example, the highest average detected concentrations for all three pathogen indicators were found in the galley wastewater. Note that a graywater source that has the highest concentration of an analyte will not necessarily contribute the greatest amount of that analyte to the wastewater treatment system or overboard discharge. The total amount of an analyte contributed by a particular graywater source also will depend on that source's volume compared to the volumes of the other sources. Flow (and thus volume) information was not able to be collected for all graywater sources (see Table 2-1).

**Chart 2. Number of Analytes Detected at Highest Average Concentration in Graywater**

Analyte Group (a)	Number of Analytes Detected in Graywater	Number of Analytes Detected at the Highest Average Concentration		
		Galley	Laundry	Accommodations
Pathogen Indicators	3	3	0	0
Classical Pollutants	15	14	1	0
Total and Dissolved Metals	43	34	4	5
Volatile and Semivolatile Organics	3	2	1	0
<b>Total</b>	<b>64</b>	<b>53</b>	<b>6</b>	<b>5</b>

(a) See Table 3-3 for information on analyte groups.

Galley wastewater contained a total of 61 analytes and showed the second highest average concentrations for 53 analytes, including all pathogen indicators, most classical pollutants, and most organics. Galley wastewater showed the highest average concentration of several analytes commonly used to measure wastewater strength: all 3 pathogen indicators, biochemical oxygen demand (BOD<sub>5</sub>), chemical oxygen demand (COD), hexane extractable material (HEM), and total suspended solids (TSS). The galley wastewater was the only graywater source that was analyzed for pesticides because this was the most likely possible source of these analytes; none were detected.

Laundry wastewater contained a total of 52 analytes and showed the highest average concentrations for 6 analytes, including nitrate/nitrite, total silver, total and dissolved lead, total titanium, and chloroform. The laundry wastewater was the only graywater source that was analyzed for dioxins and furans because this was the most likely possible source of these analytes; none were detected.

Accommodations wastewater contained a total of 54 analytes and showed the highest average concentrations among the graywater sources for 5 analytes, including total aluminum, total beryllium, total and dissolved mercury, and total vanadium.

Galley, laundry, and food pulper wastewaters are collected into holding tanks and held for discharge untreated outside of 12 nm from shore. Table 4-5 presents analytical results for galley, laundry, and food pulper overboard discharge samples, which were collected as one-time grab samples as these wastewaters were discharged overboard. In general, the same pollutants were detected in the wastewaters as generated and during overboard discharge for both the galley and laundry wastewater. (System piping precluded collection of samples of food pulper wastewater as generated.) Variability in pollutant concentrations is likely caused by variations in wastewater generation over time rather than by changes in wastewater characteristics during wastewater storage.

#### **4.1.2 Influent to Treatment System**

Table 4-6 presents analytical results for the influent to the treatment system, which was sampled for five consecutive 24-hour sampling periods. Only those analytes detected at least once in any of the wastewater samples (i.e., graywater sources, influent to treatment system, or effluent from treatment system) are included in this table. Appendices A-1 and A-2 present results for both detected and non-detected analytes.

##### **Pathogen Indicators and Classical Pollutants**

All 3 pathogen indicators and all 16 classical analytes were detected in the influent to treatment samples. Three of these detected analytes were also detected at some level in the potable water used as source water for all graywater and sewage systems (flagged by an “s” in Table 4-6; see Table 4-12 for source water results), meaning that the source water may have contributed some or all of these analytes to the samples. None of these analytes were detected in the equipment blank.

Wastewater conservation practices used onboard, such as use of vacuum toilets, result in highly concentrated wastewater. Chart 3 compares the influent to the Island treatment system to typical domestic wastewater for selected pathogen indicators and classical pollutants. Fecal coliform and enterococci concentrations in the influent to the Hamworthy treatment system were two or more orders of magnitude greater than in typical untreated domestic wastewater. Key analytes commonly used to assess wastewater strength, such as BOD<sub>5</sub>, TSS, and COD, were detected at concentrations two or more times greater than typical domestic wastewater.

**Chart 3. Comparison of Influent to Island Treatment System to Untreated Domestic Wastewater**

Parameter	Untreated Island Wastewater	Untreated Domestic Wastewater (a)
Enterococci	10 <sup>6</sup> to 10 <sup>7</sup> MPN/100 mL	10 <sup>2</sup> to 10 <sup>3</sup> number/100 mL
Fecal Coliform	10 <sup>7</sup> to 10 <sup>8</sup> CFU/100 mL	10 <sup>4</sup> to 10 <sup>5</sup> number/100 mL
Ammonia	69.6 to 139 mg/L	12 to 50 mg/L
Biological Oxygen Demand (BOD <sub>5</sub> )	224 to 409 mg/L	110 to 400 mg/L
Chemical Oxygen Demand (COD)	546 to 1,560 mg/L	250 to 1,000 mg
Nitrate/Nitrite	ND to 0.1 mg/L	0 mg/L
Oil and Grease	59.2 to 269 mg/L	50 to 150 mg/L
Total Phosphorus	16.6 to 71.6 mg/L	4 to 15 mg/L
Total Suspended Solids (TSS)	860 to 1,560 mg/L	100 to 350 mg/L

(a) Source: Metcalf & Eddy, *Wastewater Engineering*, Third Edition, 1991.  
ND - Not detected.

### **Total and Dissolved Metals**

Of the 35 metal analytes detected in the influent to treatment samples, 27 were detected in every influent to treatment sample (Table 4-6). Ten of these 35 metal analytes were detected at some level in the equipment blank (flagged by an “e” in Table 4-6; see Table 5-2 for equipment blank results), meaning that the sampling equipment may have contributed some or all of these analytes to the samples. EPA will consider the impact of possible contamination from equipment in a future analysis. Seventeen of these detected metal analytes were also detected at some level in the potable water used as source water for all graywater systems (flagged by an “s” in Table 4-6; see Table 4-12 for source water results), meaning that the source water may have contributed some or all of these analytes to the samples.

The 10 metal analytes detected at the highest concentrations were: total and dissolved sodium, total and dissolved magnesium, total and dissolved calcium, total aluminum, total copper, total iron, and total zinc. Total chromium, total and dissolved copper, total lead, total mercury, total and dissolved nickel, total and dissolved selenium, and total and dissolved zinc are priority pollutant metals (designated by EPA in 40 CFR Part 423, Appendix A) that were detected in every influent to treatment sample. Some metals may result from contact with carbon steel and stainless steel pipes and tanks in the ship.

## **Volatile and Semivolatile Organics, Pesticides, PCBs**

Among the 365 target analytes for volatile and semivolatile organics, pesticides, and polychlorinated biphenyls (PCBs), 42 were detected in any Island influent to treatment samples: 2 semivolatile organics, 3 volatile organics, 1 pesticide, and 36 PCBs (Table 4-6). Neither of the 2 detected semivolatile organics were detected in the equipment blank (see Table 5-2 for equipment blank results; volatile organics, pesticides, and PCBs were not analyzed for in the equipment blank). EPA will consider the impact of possible contamination from equipment in a future analysis.

Two semivolatile organics were detected in the influent to treatment: bis(2-ethylhexyl)phthalate and phenol. Bis(2-ethylhexyl)phthalate is used as a plasticizer (a chemical added to plastics to make them flexible) and is commonly detected in environmental samples (ATSDR, 2002). Cruise ships use a wide variety of plastic products (e.g., floor tiles, shower curtains, hoses, packaging materials and containers, PVC piping) that may result in the presence of bis(2-ethylhexyl)phthalate in the influent to treatment.

Phenol is both man-made and produced naturally. It is found in human wastes (urine), which is the most likely source for phenol's presence in the influent to the Island treatment system. It is also found in some foods (smoked summer sausage, fried chicken, mountain cheese, some species of fish). Man-made sources include the use of phenol as a slimicide, as a disinfectant, and in medicinal preparations such as ointments, ear and nose drops, and antiseptic wipes. (ATSDR, 1998) All of these are possible sources for the presence of phenol in cruise ship wastewater. Phenol was also detected in the source water (see Table 4-12 for source water results), meaning that the source water may have contributed some or all of this analyte to the samples.

Three volatile organics were detected in the influent to treatment: methylene chloride, toluene, and tetrachlorethene. Methylene chloride and toluene were each detected just above their respective detection limits in one of five influent to treatment system samples during the sampling episode. Methylene chloride is an industrial solvent commonly used in paint removers and degreasing agents; other uses include the production of photographic films,

pharmaceuticals, inks, and adhesives. Methylene chloride can also serve as a propellant for insecticides, air fresheners, and paints. (ATSDR, 2001) Toluene is a component of fuels made from crude oil; it is also a solvent used in the production of paints, paint thinners, adhesives, and rubbers (ATSDR, 2001). Methylene chloride and toluene were not detected in any of the accommodations wastewater samples; therefore, the source of these analytes may be the sewage CHT system.

Tetrachloroethene was detected in three of five influent to treatment system samples. Tetrachloroethene is a solvent used in metal cleaning and dry cleaning (ATSDR, 1997). The Island has a dry cleaning facility. According to the ship's crew, all tetrachloroethene wastes are collected for shoreside waste disposal. Tetrachloroethene was not detected in the accommodations wastewater (or any other graywater samples); therefore, the source may be the sewage CHT system.

Thirty-six PCB congeners and co-eluting congener groups were detected in the influent to the wastewater treatment system. Total PCBs in the influent were measured at a concentration of 37,100 pg/L. Two of the detected PCBs were identified as "toxic" by the World Health Organization: PCB 105 (406 pg/L) and PCB 118 (984 pg/L). PCBs have traditionally been associated with electrical equipment, such as transformers; however, they have also been used in paint formulations, carbonless copy paper and plastics (EPA, 2005). None of the detected PCBs have any known manufacturers. (Note that PCBs were not analyzed for in source water.)

Simazine was the only pesticide detected in the influent to the treatment system. EPA lists simazine as a General Use Pesticide (GUP) that has been used to control broad-leaved weeds and annual grasses in fields, berry fruit, and vegetables. Simazine is classified by EPA to be slightly toxic to practically non-toxic. In the past, simazine has been used to control algae in swimming pools, hot tubs, and whirlpools. (Exttoxnet, 1996)

#### **4.1.3 Influent to the Ultraviolet (UV) Disinfection Part of the Treatment System**

Table 4-7 presents pathogen indicator results for the influent to UV disinfection part of the Island's wastewater treatment system. Grab samples for individual pathogen indicator analyses were collected for five consecutive 24-hour sampling periods. Pathogen indicators, which were generally in the millions at the influent to the treatment system (see Table 4-6), were generally reduced to nondetect or close to the detection limit after the bioreactor and membrane filter (i.e., before the UV disinfection step). Data for the pathogen indicators in the final effluent (i.e., after the UV disinfection step) are presented in the next section.

#### **4.1.4 Effluent from the Treatment System**

Table 4-8 presents analytical results for the effluent from treatment system, which was sampled for five consecutive 24-hour sampling periods. Only those analytes detected at least once in any of the wastewater samples (i.e., graywater sources, influent to treatment system, or effluent from treatment system) are included in this table. Appendices A-1 and A-2 present results for both detected and nondetected analytes.

### **Pathogen Indicators and Classical Pollutants**

A total of 15 grab samples were collected for analysis of the three pathogen indicators over the five 24-hour sampling periods (results and collection times for each grab sample are presented in Appendix A-1). Pathogen indicators generally were not detected in the effluent from the treatment system; the exceptions to this were three grab samples in which *E. coli* was detected at levels close to the detection limit (one sample on Day 1 and two samples on Day 4), three grab samples in which enterococci was detected at levels close to the detection limit (Day 1, Day 4, and Day 5), and one grab sample in which fecal coliform was detected at 20 CFU/100 mL on Day 1 (detection limit is 2 CFU/100 mL).

Thirteen of the 16 classical pollutants were detected in effluent from treatment system samples; 3 classical pollutants (HEM, SGT-HEM, and settleable residue) were not

detected in any effluent samples. Three of the 13 detected classical analytes were also detected at some level in the potable water used as source water for all graywater and sewage systems (flagged by an “s” in Table 4-8; see Table 4-12 for source water results), meaning that the source water may have contributed some or all of the analytes to the sample. None of these analytes were detected in the equipment blank.

Chart 4 shows that classical pollutant concentrations in the effluent from the Island treatment system are lower than EPA’s standards for secondary treatment.

**Chart 4. Classical Pollutant Comparison of Effluent from Island Treatment System to Secondary Treatment Standards**

Classical Pollutant	Average Effluent from Island Treatment System	Secondary Treatment Standards (a)
Biochemical Oxygen Demand (BOD <sub>5</sub> )	<3.46 mg/L	45 mg/L
Total Suspended Solids (TSS)	<7.70 mg/L	45 mg/L

(a) 40 CFR 133.102 Secondary Treatment Regulations, 7-day average.

< Average result includes at least one nondetect value (calculations uses detection limits for nondetected results).

### **Total and Dissolved Metals**

Among the 54 total and dissolved metal analytes tested for, 31 were detected in one or more effluent from treatment samples (Table 4-8). Of these 31 detected metal analytes, 22 were detected in every effluent from treatment sample. Eight of the 31 detected metal analytes were also detected at some level in the equipment blank (flagged by an “e” in Table 4-8; see Table 5-2 for equipment blank results), meaning that the sampling equipment may have contributed some or all of this analyte to the samples. EPA will consider the impact of possible contamination from equipment in a future analyses. Seventeen of these detected metal analytes were also detected at some level in the potable water used as source water for all graywater and sewage systems (flagged by an “s” in Table 4-8; see Table 4-12 for source water results), meaning that the source water may have contributed some or all of the analytes to the sample.

The 10 metal analytes detected at the highest concentrations were total and dissolved calcium, magnesium, sodium, zinc, and boron. Total and dissolved copper, nickel, selenium, zinc, and total mercury are priority pollutant metals (designated by EPA in 40 CRF

Part 423, Appendix A) that were detected in every effluent from treatment sample. Some metals may result from contact with carbon steel and stainless steel pipes and tanks in the ship. There are no EPA secondary treatment standards for metals.

### **Volatile and Semivolatile Organics, Pesticides, PCBs, Dioxins and Furans**

Among the 84 target analytes for volatile and semivolatile organics analyzed, only two—phenol and bis(2-ethylhexyl)phthalate—were detected in any Island effluent samples (Table 4-8). Phenol is found in urine and bis(2-ethylhexyl)phthalate is used in plastics (see Section 4.1.2). Phenol was detected at some level in the potable water used as source water for all graywater and sewage systems (flagged by an “s” in Table 4-8; see Table 4-12 for source water results), meaning that the source water may have contributed some or all of the analyte to the sample.

Pesticides, PCBs, and dioxins and furans were not analyzed for in the effluent from the treatment system.

#### **4.1.5 Wastewater Treatment System Performance: Comparison of Influent to Treatment System and Effluent from Treatment System**

The Hamworthy treatment system successfully removed almost all pathogen indicators (>99%; Table 4-9) and most classical pollutants, metals, and organics (Tables 4-9 and 4-10).

### **Pathogen Indicators and Classical Pollutants**

Pathogen indicators were generally removed by the bioreactor and membrane filters to levels below detection (>99% removal), while any remaining indicators were generally removed by UV disinfection (overall system efficiency >99%, see Table 4-9). Enterococci and *E. coli* were each detected in 3 of the 15 effluent from treatment samples at levels close to the detection limit; fecal coliform was detected in 1 of the 15 samples.

The treatment system removed almost all biochemical oxygen demand (BOD<sub>5</sub>) (99%), and most chemical oxygen demand (COD) (93%) and total organic carbon (TOC) (89%) (Table 4-10). The system also removed almost all settleable residue and total suspended solids (TSS) (both 99% or greater). Oils and greases (HEM and SGT-HEM) were removed to levels below detection.

The treatment system reduced ammonia by 58%, while reducing total Kjeldahl nitrogen (TKN, which measures both ammonia and organic forms of nitrogen) and total phosphorus by approximately 75% (Table 4-10). Nitrate/nitrite levels are low and remained relatively unchanged. Nitrogen is likely taken up by the microorganisms in the bioreactor and removed from the system in the waste biosludge. It is unlikely that nitrogen is removed by nitrification (the mechanism of ammonia biodegradation) as nitrification would have resulted in an increase in nitrate/nitrite concentration, but these levels remained relatively unchanged. Phosphorus also is most likely taken up by the microorganisms in the bioreactor as evidenced by elevated total phosphorus concentrations in the waste biosludge (see Section 4.1.6 and Table 4-11).

### **Total and Dissolved Metals**

The total metals analysis measures both the particulate and dissolved forms of metals, while the dissolved metals analysis measures only the dissolved form. The difference between the total and dissolved metals measurements is the particulate metals concentration. Metals were present in both particulate and dissolved forms in the influent to the treatment system (i.e., the total metals concentrations exceeded the dissolved metals concentrations for most metal analytes) (Table 4-6). In comparison, metals were predominantly present in the dissolved form in the effluent from the treatment system (i.e., the total and dissolved metals concentrations were similar in these samples) (Table 4-8). Furthermore, there were elevated metals concentrations in the screening solids and waste biosludge (see Table 4-11). This means that the treatment system is highly efficient in removing particulate metals, as would be expected for membrane filtration (and as supported by ≥99% removal of settleable residue and TSS, see Table 4-8). The treatment systems removed dissolved metals with an average efficiency of 37% (Table 4-10).

## **Volatile and Semivolatile Organics, Pesticides, PCBs, Dioxins and Furans**

The treatment system was able to remove most of the volatile and semivolatile organic compounds to levels below detection (Table 4-10). Possible removal mechanisms include biological degradation, adsorption onto wastewater treatment sludge (see Table 4-11), and/or volatilization.

Simazine was the only pesticide detected in the influent to treatment, and pesticides were not analyzed for in the effluent from treatment. While PCBs were detected in the influent to treatment, they were not analyzed for in the effluent from treatment. EPA has no data regarding the performance of the Hamworthy treatment system for removing pesticides and PCBs. Dioxins and furans were not analyzed for in either the influent to or effluent from the treatment system. Dioxins and furans were analyzed for in laundry wastewater, and none were detected.

### **4.1.6 Screening Solids, Waste Biosludge, and Incinerator Ash**

Table 4-11 presents the results for analytes detected in one-time grab samples of screening solids (from screens presses at the beginning of the treatment system), waste biosludge (excess biological mass from the treatment system's bioreactor), and incinerator ash (from incineration of trash, screening solids, and spent bag filters) collected during the sampling episode. Table 4-11 also shows the average influent to treatment analyte concentrations from Table 4-10 for comparison.

Most of the analytes detected in the screening solids and waste biosludge were also detected in the influent to treatment. For many analytes, concentrations in the screening solids and waste biosludge exceeded those in the influent to treatment, suggesting that these analytes are removed from the system in these waste streams. See Section 4.1.5 for a detailed discussion of wastewater treatment system performance.

#### **4.1.7 Source Water**

Potable water is used as source water for all ship operations that generate graywater and sewage (e.g., laundry, galley, food pulper, sinks, showers, and toilets). Potable water is produced onboard and bunkered while in port, with produced water providing approximately two-thirds of freshwater requirements and bunkered water providing approximately one-third of freshwater requirements. Seven total metals, 11 dissolved metals, 3 classical pollutants, and 1 organic were detected in the one-time grab sample of potable water collected during this sampling episode (Table 4-12). None of the analytes detected in the source water exceeded Federal drinking water standards (Table 4-12). Pathogen indicators were not detected in the source water sample.

#### **4.2 Summary of Interviews Regarding Activities that Impact Wastewater Generation**

The ship's crew was interviewed to obtain information regarding activities that impact wastewater generation (see Appendix C for detailed reports). The ship's crew provided operational, discharge, and wastewater treatment operating logs corresponding to the period of the sampling episode. These documents are included in the Cruise Ship Rulemaking Record and are available upon request.

##### **4.2.1 Wastewater Generation**

###### **Galley**

The Island has two main dining rooms, four additional restaurants, and 24-hour room service. Approximately 10,000 meals (breakfast, lunch, dinner, and snacks) are served daily. The ship's ten main automatic washing machines operate 24-hours a day. Dishes are washed using Solid Power and Super Trump (high alkaline solid automatic dishmachine detergents). Floors are washed using Encomp cleaning solution. Material Safety Data Sheets (MSDS) for these products are included in the Cruise Ship Rulemaking Record and are available upon request.

## **Laundry**

The Island operates one large continuous tunnel washer to wash towels and linens from approximately 0800 to 1500 and 2000 to 0100 each day. Cleaning agents (Laundri SL-2000 and Eco-Star Detergent 1) are dispensed automatically using a computer-controlled menu depending on the material and degree of soiling. The Island operates two large washing machines to wash blankets (total of 10 loads per day at 300 pound capacity each) and two small washing machines (50 pound capacity) to wash passengers' personal items (operate from approximately 2000 to 0600 each day). MSDS for laundry cleaning agents are included in the Cruise Ship Rulemaking Record and are available upon request. Finally, the Island has six passenger laundrettes and six crew and officer laundrettes, processing approximately 40 pounds of laundry per load.

## **Photo Processing**

The Island has an onboard photo processing lab with all digital photo processing equipment. All waste photographic chemicals are collected into drums for disposal onshore. The drums are stored within secondary containment to capture any spills. The sink in the photo lab drains to a drum for disposal onshore. The photo lab has two floor drains that are capped to ensure that spilled chemicals do not enter the drain system. Any spills are captured in in-room storage containers for shore disposal.

## **Print Shop**

The Island houses a print shop. The floor drain is capped and any spills are captured in an in-room storage container for shore disposal. The print shop sink drains to a drum for onshore disposal. All print shop wastes (cleaning rags with solvents and chemical residues) are disposed of as hazardous waste onshore.

## **Dry Cleaning**

The Island has a dry cleaning facility. One Renzacci dry cleaning machine processes approximately five loads per day using auto-distillation of solvent. This machine generated five liters of spent solvent during the first seven months of 2004; spent solvent is disposed of onshore as hazardous waste. Dry cleaning wastewater (condensate separator water) is routed to the laundry CHT system. Two Aquatex machines process approximately 15 loads per day using a water-based chemical which produces non-hazardous waste, according to the crew. Aquatex wastewater and lint waste is routed to the laundry CHT systems. No sinks or floor drains are present in the dry cleaning facility.

## **Chemical Storage**

Any spills from the engine room storage areas are captured in the bilge and do not enter the graywater or sewage systems. See Appendix C for more information on chemicals stored in each engine room. Chemicals are also stored in other rooms of the ship as listed in Appendix C; none of the storage rooms have floor drains to ensure that spilled chemicals do not enter the graywater and sewage systems.

## **Medical Infirmary**

The Island has a medical infirmary. Water that enters the floor drain or sinks drains to the graywater system; there is no floor drain in the digital imaging room. Sinks are used for handwashing only; the crew indicated that no chemicals are disposed of in the sinks. Any wastes are collected by the environmental officer for onshore disposal.

### **4.2.2 Pesticide, Fungicide, and Rodenticide Use**

The Island uses Siege Gel insecticide bait (active ingredient hydramethylnon) and Maxforce bait stations (active ingredient fipronil) to control insect pests. Aerosol insecticides used onboard include Cy-kick (active ingredient cyfluthron) and 565 Plus XLO (active

ingredients pyrethrins and allethrin). MSDS for insect control agents are included in the Cruise Ship Rulemaking Record and are available upon request. The pesticide Simazine was detected in one Island influent to treatment sample. Simazine is a selective herbicide used to control weeds and grasses in food and feed crops; it is also widely used for nonselective weed control in industrial areas. In the past, Simazine was used to control submerged weeds and algae in large aquariums and swimming pools. (Exttoxnet, 1996)

Victor glue traps are set up to catch rodents. The Island does not use fungicides or rodenticides onboard.

#### **4.3            Flow Data**

Strap-on ultrasonic flow meters were used to collect flow measurements and to control automatic composite sample machines on (1) the outlet from the crew galley collection tank, (2) the outlet from one of the accommodations wastewater collection tanks, (3) the influent to wastewater treatment, (4) and the effluent from wastewater treatment (see Section 2.4 and Figures 2-1 and 2-2). The flow meters were programmed to record the instantaneous flow rate ( $\text{m}^3/\text{min}$ ) and total flow ( $\text{m}^3$ ) every five minutes. Flow data analyses presented in this section are based on only those flow data collected during the sampling episode of August 28 through September 2. Appendix B presents all flow data collected while onboard the Island from August 23 through September 3.

The flow meters on the outlet pipes from the galley and accommodations collection tanks recorded large negative flows when the tank discharge pumps were not operating, indicating significant backflow through these systems. Accordingly, the recorded flows do not accurately represent galley and accommodations wastewater generation at these locations and are not described further in this report.

The total daily volume of influent to and effluent from the treatment system for each 24-hour sampling period are presented in Figure 4-1. The influent to the treatment system flow was, on average, 75 percent of the flow measured from the effluent from the treatment system. One possible explanation is that the ultrasonic signal to the flow meter at the influent to

treatment system was weakened (or scattered) by the amount of solids present in the raw wastewater flowing through the pipe. A comparison of the average hourly flows indicates that the influent and effluent discharge flow rates show similar fluctuation throughout the day. Therefore, the flow measurements collected from the influent to the treatment are probably valid for qualitative use. The total daily flow from the influent remained relatively constant over the five-day sampling period, regardless of whether the ship was in port (Days 1, 4, and 5) or at sea (Days 2 and 3).

The Island discontinued discharge of effluent from the treatment system for part of Day 3 of this sampling episode (while it cruised Glacier Bay National Park) and diverted the wastewater to a holding tank for overboard discharge outside of 12 nm of shore, as can be seen by the dip in the total daily effluent discharge on Day 3. Daily effluent flow rates and flow per capita are presented in Table 4-13. Per capita flow rates were calculated based on 2,925 people (2,019 passengers and 906 crew) onboard during the sampling episode, as reported by the ship's crew. On average, each person generated approximately 41 gallons of treated wastewater per person per day. It is important to note that the treatment system treats only accommodations wastewater and sewage. The flow measurements do not reflect other activities that occur onboard such as wastewater generated by the galley (galley and food pulper wastewater) and laundry.

Figure 4-2 presents the average effluent from treatment flow for each hour interval over the five consecutive 24-hour sampling periods, calculated from data collected via the strap-on flow meter. The highest rate of overboard discharge occurs between the hours of 2100 and 0400.

Table 4-1

## Galley Wastewater Analytical Results, Island Princess

Analytical results for galley wastewater for analytes detected at least once in wastewater samples during the sampling episode. See Appendices A-1 and A-2 for all analytical results (detected and nondetected). Galley wastewater samples were collected for five consecutive 24-hour periods; see Section 3.2 for the sample collection methodology. Table 2-1 lists the specific wastewater streams in galley wastewater, and Figure 2-1 identifies the sampling point location. Average galley wastewater concentrations determined from the daily results. Priority pollutants (designated by EPA in 40 CFR Part 423, Appendix A) are identified where applicable.

Analyte	Unit	Priority Pollutant Code	Galley (SP-1) (a) Day1	Galley (SP-1) (a) Day2	Galley (SP-1) (a) Day3	Galley (SP-1) (a) Day4	Galley (SP-1) (a) Day5	Average Galley (SP-1) (a)
<b>Pathogen Indicator Analyses</b>								
<i>E. coli</i> (b)	MPN/100 mL		65,300 [N=2]	2,200,000 [N=2]	1,730,000 [N=2]	210,000 [N=2]	65,700 [N=2]	854,000
Enterococci (b)	MPN/100 mL		31,900 [N=2]	>1,360 [N=2]	14,100 [N=2]	21,800 [N=2]	250 [N=2]	>13,900
Fecal Coliform (b)	CFU/100 mL		6,350,000 [N=2]	56,000,000 [N=2]	455,000,000 [N=2]	550,000 [N=2]	590,000 [N=2]	104,000,000
<b>Classical Pollutants</b>								
Alkalinity	mg/L		156	72.0	124	ND(10.0)	171	<107
Ammonia As Nitrogen (NH <sub>3</sub> -N) (s)	mg/L		1.09	0.840	49.0	3.48	1.14	11.1
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L		919	803	1,050	4,860	EXCLUDE	1,910
Chemical Oxygen Demand (COD)	mg/L		1,830	1,890	1,140	5,760	2,550	2,630
Chloride	mg/L		178	110	1,460	190	90.0	406
Hardness (s)	mg/L		42.0	38.1	503	87.3	54.0	145
Hexane Extractable Material (HEM)	mg/L		212	238	236	270	440	279
Nitrate/Nitrite (NO <sub>2</sub> -N + NO <sub>3</sub> -N)	mg/L		0.100	0.100	ND(0.0500)	ND(0.0500)	0.120	<0.0840
Settleable residue	mL/L		4.00	1.60	0.200	61.0	EXCLUDE	16.7
Silica Gel Treated HEM (SGT-HEM)	mg/L		ND(4.90)	ND(4.80)	ND(5.00)	ND(5.10)	ND(5.00)	ND(4.96)

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g.,[N=2]). See Appendix A-1 for all individual grab sample results.

(c) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-1 (Continued)

Analyte	Unit	Priority Pollutant Code	Galley (SP-1) (a) Day1	Galley (SP-1) (a) Day2	Galley (SP-1) (a) Day3	Galley (SP-1) (a) Day4	Galley (SP-1) (a) Day5	Average Galley (SP-1) (a)
Sulfate	mg/L		73.0	57.0	216	20.0	111	95.4
Total Dissolved Solids (TDS)	mg/L		1,290	788	3,420	2,010	1,090	1,720
Total Kjeldahl Nitrogen (TKN) (s)	mg/L		37.1	29.8	90.6	126	28.2	62.3
Total Organic Carbon (TOC)	mg/L		392	275	297	1,200	333	499
Total Phosphorus	mg/L		4.10	15.2	13.3	36.4	50.0	23.8
Total Suspended Solids (TSS)	mg/L		262	266	248	3,720	400	979
<b>Total and Dissolved Metals</b>								
Aluminum, Total	ug/L		806	3,300	263	811	1,000	1,240
Antimony, Total	ug/L	P114	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)
Barium, Total (e)	ug/L		56.0	34.0	12.0	23.0	48.2	34.6
Beryllium, Total (e)	ug/L	P117	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)
Boron, Total	ug/L		ND(3.37)	ND(3.37)	434	207	139	<157
Cadmium, Total	ug/L	P118	ND(0.446)	ND(0.446)	1.00	0.580	ND(0.446)	<0.584
Calcium , Total (s)	ug/L		12,300	11,800	46,000	23,500	16,800	22,100
Chromium, Total	ug/L	P119	11.0	7.00	ND(1.68)	7.20	9.50	<7.28
Cobalt, Total	ug/L		ND(0.914)	ND(0.914)	1.00	ND(0.914)	ND(0.914)	<0.931
Copper, Total (s)	ug/L	P120	452	852	152	807	836	620
Iron, Total	ug/L		813	842	367	918	574	703
Lead, Total (e)	ug/L	P122	8.00	6.00	ND(3.08)	9.50	7.90	<6.90
Magnesium, Total (s)	ug/L		2,740	2,100	94,200	6,960	2,930	21,800
Manganese, Total (e)	ug/L		32.0	31.0	40.0	81.0	21.9	41.2

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g.,[N=2]). See Appendix A-1 for all individual grab sample results.

(c) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-1 (Continued)**

Analyte	Unit	Priority Pollutant Code	Galley (SP-1) (a) Day1	Galley (SP-1) (a) Day2	Galley (SP-1) (a) Day3	Galley (SP-1) (a) Day4	Galley (SP-1) (a) Day5	Average Galley (SP-1) (a)
Mercury, Total (e) (s)	ug/L	P123	ND(0.0170)	ND(0.0170)	ND(0.0170)	0.210	0.150	<0.0822
Nickel, Total	ug/L	P124	28.0	28.0	22.0	34.2	22.9	27.0
Selenium, Total (s)	ug/L	P125	1.00	1.00	70.0	2.90	1.30	15.2
Silver, Total	ug/L	P126	ND(1.28)	ND(1.28)	ND(1.28)	ND(1.28)	ND(1.28)	ND(1.28)
Sodium, Total (s)	ug/L		256,000	126,000	788,000	181,000	192,000	309,000
Thallium, Total	ug/L	P127	ND(0.00900)	ND(0.00900)	ND(0.00900)	0.0200	0.0100	<0.0114
Tin, Total	ug/L		13.0	8.00	5.00	31.6	70.9	25.7
Titanium, Total	ug/L		6.00	4.00	ND(0.253)	2.00	5.00	<3.45
Vanadium, Total	ug/L		ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)
Zinc, Total (e) (s)	ug/L	P128	1,030	644	587	2,160	1,010	1,090
Aluminum, Dissolved	ug/L		723	910	159	600	523	583
Barium, Dissolved (e)	ug/L		22.2	7.70	10.6	13.8	24.2	15.7
Boron, Dissolved	ug/L		ND(3.37)	ND(3.37)	417	ND(3.37)	ND(3.37)	<86.1
Calcium, Dissolved (s)	ug/L		10,700	9,170	44,000	20,800	13,600	19,700
Chromium, Dissolved	ug/L	P119	4.90	2.10	ND(1.68)	2.50	5.50	<3.34
Cobalt, Dissolved (s)	ug/L		2.90	6.40	3.50	6.40	5.00	4.84
Copper, Dissolved (e) (s)	ug/L	P120	400	726	99.8	467	700	479
Iron, Dissolved (s)	ug/L		535	281	270	286	429	360
Lead, Dissolved (e)	ug/L	P122	6.70	3.20	ND(3.08)	ND(3.08)	8.70	<4.95
Magnesium, Dissolved (s)	ug/L		2,670	1,850	90,600	6,100	2,920	20,800
Manganese, Dissolved (e) (s)	ug/L		22.7	20.2	8.30	9.80	23.9	17.0

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g.,[N=2]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-1 (Continued)

Analyte	Unit	Priority Pollutant Code	Galley (SP-1) (a) Day1	Galley (SP-1) (a) Day2	Galley (SP-1) (a) Day3	Galley (SP-1) (a) Day4	Galley (SP-1) (a) Day5	Average Galley (SP-1) (a)
Mercury, Dissolved (e) (s)	ug/L	P123	0.0300	0.0300	0.0400	0.120	0.0900	0.0620
Nickel, Dissolved (s)	ug/L	P124	26.4	22.5	21.5	30.0	21.2	24.3
Selenium, Dissolved	ug/L	P125	1.00	1.00	70.0	2.90	1.50	15.3
Sodium, Dissolved (s)	ug/L		248,000	123,000	746,000	171,000	184,000	294,000
Thallium, Dissolved (e)	ug/L	P127	0.0100	ND(0.00900)	0.0100	0.0100	ND(0.00900)	<0.00960
Tin, Dissolved	ug/L		9.00	4.80	ND(3.45)	7.20	50.7	<15.0
Titanium, Dissolved	ug/L		5.20	ND(0.253)	ND(0.253)	ND(10.0)	ND(10.0)	<5.14
Vanadium, Dissolved	ug/L		1.40	2.90	1.80	ND(0.679)	ND(0.679)	<1.49
Zinc, Dissolved (e) (s)	ug/L	P128	864	617	496	1,880	923	956
<b>Volatile and Semivolatile Organics</b>								
Bis(2-ethylhexyl) Phthalate	ug/L	P066	271	201	ND(10.0)	170	350	<200
Chloroform	ug/L	P023	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	13.7	<10.7
Methylene Chloride	ug/L	P044	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Phenol (s)	ug/L	P065	90.9	125	89.7	96.9	85.1	97.5
Tetrachloroethene	ug/L	P085	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Toluene	ug/L	P086	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
<b>Pesticides</b>								
Simazine	ug/L		NC	NC	ND(8.00)	NC	NC	ND(8.00)

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g.,[N=2]). See Appendix A-1 for all individual grab sample results.

(c) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-2**

**Laundry Wastewater Analytical Results, Island Princess**

Analytical results for laundry wastewater for analytes detected at least once in wastewater samples during the sampling episode. See Appendices A-1 and A-2 for all analytical results (detected and nondetected). Laundry wastewater samples were collected for five consecutive 24-hour periods; see Section 3.2 for the sample collection methodology. Table 2-1 lists the specific wastewater streams in laundry wastewater, and Figure 2-1 identifies the sampling point location. Average laundry wastewater concentrations determined from the daily results. Priority pollutants (designated by EPA in 40 CFR Part 423, Appendix A) are identified where applicable.

Analyte	Unit	Priority Pollutant Code	Laundry (SP-2) (a) Day 1	Laundry (SP-2) (a) Day 2	Laundry (SP-2) (a) Day 3	Laundry (SP-2) (a) Day 4	Laundry (SP-2) (a) Day 5	Average Laundry (SP-2) (a)
<b>Pathogen Indicator Analyses</b>								
<i>E. coli</i> (b)	MPN/100 mL		ND(1.00) [N=1]	ND(5.50) [N=2]	ND(1.00) [N=2]	< 1.50 [N=2]	<104 [N=2]	<22.5
Enterococci (b)	MPN/100 mL		1.00 [N=1]	ND(5.50) [N=2]	ND(1.00) [N=2]	# 1,210 [N=2]	# 1,210 [N=2]	#486
Fecal Coliform (b)	CFU/100 mL		ND(2.00) [N=1]	<140 [N=2]	<57.5 [N=2]	<276 [N=2]	<4,350 [N=2]	<965
<b>Classical Pollutants</b>								
Alkalinity	mg/L		51.0	78.0	57.0	62.0	63.0	62.2
Ammonia As Nitrogen (NH <sub>3</sub> -N) (s)	mg/L		5.30	0.320	0.200	0.400	0.250	1.29
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L		73.1	68.5	149	110	EXCLUDE	100
Chemical Oxygen Demand (COD)	mg/L		300	442	366	444	350	380
Chloride	mg/L		34.0	27.0	36.0	44.0	26.0	33.4
Hardness (s)	mg/L		23.3	20.4	21.0	21.8	39.3	25.2
Hexane Extractable Material (HEM)	mg/L		NC	7.50	9.40	5.60	8.40	7.73
Nitrate/Nitrite (NO <sub>2</sub> -N + NO <sub>3</sub> -N)	mg/L		0.120	0.170	0.120	0.150	0.190	0.150

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with a minimum of one and a maximum of two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=2]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-2 (Continued)

Analyte	Unit	Priority Pollutant Code	Laundry (SP-2) (a) Day 1	Laundry (SP-2) (a) Day 2	Laundry (SP-2) (a) Day 3	Laundry (SP-2) (a) Day 4	Laundry (SP-2) (a) Day 5	Average Laundry (SP-2) (a)
Settleable residue	mL/L		ND(0.100)	0.300	5.60	0.900	EXCLUDE	<1.73
Silica Gel Treated HEM (SGT-HEM)	mg/L		NC	ND(4.40)	ND(5.00)	ND(4.90)	ND(5.20)	ND(4.88)
Sulfate	mg/L		22.0	19.0	22.0	19.0	21.0	20.6
Total Dissolved Solids (TDS)	mg/L		218	248	298	304	211	256
Total Kjeldahl Nitrogen (TKN) (s)	mg/L		ND(20.0)	6.30	5.10	8.60	4.50	<8.90
Total Organic Carbon (TOC)	mg/L		54.4	98.6	76.0	98.0	66.6	78.7
Total Phosphorus	mg/L		6.00	6.50	11.4	10.7	6.90	8.30
Total Suspended Solids (TSS)	mg/L		56.0	66.0	80.0	63.0	46.0	62.2
<b>Total and Dissolved Metals</b>								
Aluminum, Total	ug/L		167	155	187	209	111	166
Antimony, Total	ug/L	P114	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)
Barium , Total (e)	ug/L		17.0	15.0	17.0	30.7	33.0	22.5
Beryllium, Total (e)	ug/L	P117	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0504)
Boron, Total	ug/L		ND(3.37)	ND(3.37)	ND(3.37)	ND(3.37)	ND(3.37)	ND(3.37)
Cadmium, Total	ug/L	P118	ND(0.446)	ND(0.446)	ND(0.446)	ND(0.446)	ND(0.446)	ND(0.446)
Calcium, Total (s)	ug/L		7,900	7,390	7,630	8,000	13,600	8,904
Chromium, Total	ug/L	P119	3.00	3.00	12.0	5.30	1.80	5.02
Cobalt, Total	ug/L		ND(0.914)	ND(0.914)	1.00	ND(0.914)	ND(0.914)	<0.931

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with a minimum of one and a maximum of two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=2]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

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# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-2 (Continued)**

Analyte	Unit	Priority Pollutant Code	Laundry (SP-2) (a) Day 1	Laundry (SP-2) (a) Day 2	Laundry (SP-2) (a) Day 3	Laundry (SP-2) (a) Day 4	Laundry (SP-2) (a) Day 5	Average Laundry (SP-2) (a)
Copper, Total (s)	ug/L	P120	261	304	298	484	277	325
Iron, Total	ug/L		120	164	460	319	86.1	230
Lead, Total (e)	ug/L	P122	3.40	5.00	26.0	18.8	6.20	11.9
Magnesium, Total (s)	ug/L		861	470	474	453	1,290	710
Manganese, Total (e)	ug/L		3.00	3.00	7.00	4.70	2.10	3.96
Mercury, Total (e) (s)	ug/L	P123	0.0300	0.0400	0.0300	0.150	0.170	0.084
Nickel, Total	ug/L	P124	7.00	7.00	11.0	10.1	4.20	7.86
Selenium, Total (s)	ug/L	P125	4.00	ND(0.572)	ND(0.572)	0.610	ND(0.572)	<1.27
Silver, Total	ug/L	P126	3.00	3.00	7.00	6.20	ND(1.28)	<4.10
Sodium, Total (s)	ug/L		43,000	51,800	50,600	59,200	37,100	48,300
Thallium, Total	ug/L	P127	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)
Tin, Total	ug/L		ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)
Titanium, Total	ug/L		ND(0.253)	4.00	7.00	6.10	7.50	<4.97
Vanadium, Total	ug/L		ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)
Zinc, Total (e) (s)	ug/L	P128	481	328	685	510	348	470
Aluminum, Dissolved	ug/L		97.2	ND(9.93)	ND(9.93)	95.3	50.5	<52.6
Barium, Dissolved (e)	ug/L		12.2	5.80	3.70	6.50	24.5	10.5
Boron, Dissolved	ug/L		ND(3.37)	ND(3.37)	ND(3.37)	ND(3.37)	ND(3.37)	ND(3.37)

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with a minimum of one and a maximum of two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=2]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

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# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-2 (Continued)**

Analyte	Unit	Priority Pollutant Code	Laundry (SP-2) (a) Day 1	Laundry (SP-2) (a) Day 2	Laundry (SP-2) (a) Day 3	Laundry (SP-2) (a) Day 4	Laundry (SP-2) (a) Day 5	Average Laundry (SP-2) (a)
Calcium, Dissolved (s)	ug/L		7,270	6,660	6,170	7,080	13,100	8,060
Chromium, Dissolved	ug/L	P119	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)
Cobalt, Dissolved (s)	ug/L		3.00	2.70	2.90	2.50	2.30	2.68
Copper, Dissolved (e) (s)	ug/L	P120	193	202	212	392	213	242
Iron, Dissolved (s)	ug/L		ND(19.8)	ND(19.8)	ND(19.8)	61.1	45.9	<33.3
Lead, Dissolved (e)	ug/L	P122	5.70	ND(3.08)	8.80	6.50	3.90	<5.60
Magnesium, Dissolved (s)	ug/L		816	433	408	421	1,270	670
Manganese, Dissolved (e) (s)	ug/L		5.10	4.90	6.30	6.00	4.70	5.40
Mercury, Dissolved (e) (s)	ug/L	P123	0.0200	0.0500	0.0500	0.110	0.160	0.0780
Nickel, Dissolved (s)	ug/L	P124	4.80	3.30	5.70	5.10	4.60	4.70
Selenium, Dissolved	ug/L	P125	0.860	0.600	ND(0.572)	0.660	0.800	<0.689
Sodium, Dissolved (s)	ug/L		42,600	51,900	49,000	59,000	36,800	47,900
Thallium, Dissolved (e)	ug/L	P127	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)
Tin, Dissolved	ug/L		ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)
Titanium, Dissolved	ug/L		ND(0.253)	ND(0.253)	ND(0.253)	ND(10.0)	ND(10.0)	ND(4.15)
Vanadium, Dissolved	ug/L		ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)
Zinc, Dissolved (e) (s)	ug/L	P128	324	204	535	355	277	339

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with a minimum of one and a maximum of two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=2]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-2 (Continued)**

Analyte	Unit	Priority Pollutant Code	Laundry (SP-2) (a) Day 1	Laundry (SP-2) (a) Day 2	Laundry (SP-2) (a) Day 3	Laundry (SP-2) (a) Day 4	Laundry (SP-2) (a) Day 5	Average Laundry (SP-2) (a)
<b>Volatile and Semivolatile Organics</b>								
Bis(2-ethylhexyl) Phthalate	ug/L	P066	75.4	120	113	102	52.4	92.6
Chloroform	ug/L	P023	94.9	90.7	106	129	86.1	101
Methylene Chloride	ug/L	P044	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Phenol (s)	ug/L	P065	133	73.8	101	84.6	73.6	93.2
Tetrachloroethene	ug/L	P085	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Toluene	ug/L	P086	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with a minimum of one and a maximum of two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=2]). See Appendix A-1 for all individual grab sample results.

(c) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-3

### Accommodations Wastewater Analytical Results, Island Princess

Analytical results for accommodations wastewater for analytes detected at least once in wastewater samples during the sampling episode. See Appendices A-1 and A-2 for all analytical results (detected and nondetected). Accommodations wastewater samples were collected for five consecutive 24-hour periods; see Section 3.2 for the sample collection methodology. Table 2-1 lists the specific wastewater streams in accommodations wastewater, and Figure 2-1 identifies the sampling point location. Average accommodations wastewater concentrations determined from the daily results. Priority pollutants (designated by EPA in 40 CFR Part 423, Appendix A) are identified where applicable.

Analyte	Unit	Priority Pollutant Code	Accommodations (SP-3) (a) Day 1	Accommodations (SP-3) (a) Day 2	Accommodations (SP-3) (a) Day 3	Accommodations (SP-3) (a) Day 4	Accommodations (SP-3) (a) Day 5	Average Accommodations (SP-3) (a)
<b>Pathogen Indicator Analyses</b>								
<i>E. coli</i> (b)	MPN/100 mL		< 150 [N=2]	< 83,500 [N=2]	< 521 [N=2]	< 1,920 [N=2]	7.30 [N=2]	<17,200
Enterococci (b)	MPN/100 mL		> 1,210 [N=2]	> 1,640 [N=2]	> 1,410 [N=2]	22.5 [N=2]	< 555 [N=2]	#966
Fecal Coliform (b)	CFU/100 mL		190,000 [N=2]	355,000 [N=2]	285,000 [N=2]	< 43,000 [N=2]	3,300 [N=2]	<175,000
<b>Classical Pollutants</b>								
Alkalinity	mg/L		73.0	126	96.0	63.0	91.0	89.8
Ammonia As Nitrogen (NH <sub>3</sub> -N) (s)	mg/L		0.680	0.330	0.400	0.340	0.400	0.430
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L		158	144	170	109	EXCLUDE	145
Chemical Oxygen Demand (COD)	mg/L		331	408	332	1,050	340	492
Chloride	mg/L		15.0	20.0	15.0	12.0	19.0	16.2
Hardness (s)	mg/L		24.7	22.6	20.4	20.7	36.9	25.1
Hexane Extractable Material (HEM)	mg/L		17.3	21.2	10.1	16.2	15.8	16.1
Nitrate/Nitrite (NO <sub>2</sub> -N+ NO <sub>3</sub> -N)	mg/L		0.0500	0.100	ND(0.0500)	ND(0.0500)	0.100	<0.0700
Settleable Residue	mL/L		1.30	0.500	ND(0.100)	0.230	EXCLUDE	<0.533

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=2]). See Appendix A-1 for all individual grab sample results.

(c) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-3 (Continued)

Analyte	Unit	Priority Pollutant Code	Accommodations (SP-3) (a) Day 1	Accommodations (SP-3) (a) Day 2	Accommodations (SP-3) (a) Day 3	Accommodations (SP-3) (a) Day 4	Accommodations (SP-3) (a) Day 5	Average Accommodations (SP-3) (a)
Silica Gel Treated HEM (SGT-HEM)	mg/L		ND(4.90)	ND(4.80)	ND(4.70)	ND(5.00)	ND(4.40)	ND(4.76)
Sulfate	mg/L		18.0	30.0	13.0	11.0	13.0	17.0
Total Dissolved Solids (TDS)	mg/L		226	284	221	142	214	217
Total Kjeldahl Nitrogen (TKN) (s)	mg/L		4.20	9.80	6.40	5.90	7.80	6.82
Total Organic Carbon (TOC)	mg/L		66.9	65.4	53.8	34.2	44.8	53.0
Total Phosphorus	mg/L		1.31	0.700	0.580	0.360	0.880	0.766
Total Suspended Solids (TSS)	mg/L		66.0	102	102	66.0	80.0	83.2
<b>Total and Dissolved Metals</b>								
Aluminum, Total	ug/L		4,820	10,700	7,070	3,890	9,080	7,110
Antimony, Total	ug/L	P114	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)
Barium, Total (e)	ug/L		17.0	17.0	14.0	10.8	33.9	18.5
Beryllium, Total (e)	ug/L	P117	0.190	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)	<0.0812
Boron, Total	ug/L		ND(3.37)	ND(3.37)	ND(3.37)	169	266	<89.0
Cadmium, Total	ug/L	P118	ND(0.446)	ND(0.446)	ND(0.446)	ND(0.446)	ND(0.446)	ND(0.446)
Calcium, Total (s)	ug/L		8,290	7,690	7,120	7,490	12,800	8,680
Chromium, Total	ug/L	P119	2.00	4.00	3.00	ND(1.68)	4.80	<3.10
Cobalt, Total	ug/L		ND(0.914)	1.00	ND(0.914)	ND(0.914)	ND(0.914)	<0.931
Copper, Total (s)	ug/L	P120	413	713	387	640	745	580
Iron, Total	ug/L		259	170	163	118	183	179
Lead, Total (e)	ug/L	P122	6.00	5.00	5.00	4.00	8.80	5.76
Magnesium, Total (s)	ug/L		966	819	646	495	1,190	823

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=2]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-3 (Continued)

Analyte	Unit	Priority Pollutant Code	Accommodations (SP-3) (a) Day 1	Accommodations (SP-3) (a) Day 2	Accommodations (SP-3) (a) Day 3	Accommodations (SP-3) (a) Day 4	Accommodations (SP-3) (a) Day 5	Average Accommodations (SP-3) (a)
Manganese, Total (e)	ug/L		11.0	7.00	5.00	3.50	6.10	6.52
Mercury, Total (e) (s)	ug/L	P123	0.0400	0.0400	0.0700	0.160	0.170	0.0960
Nickel, Total	ug/L	P124	14.0	10.0	11.0	13.5	13.4	12.4
Selenium, Total (s)	ug/L	P125	1.00	ND(0.572)	ND(0.572)	0.580	0.640	<0.673
Silver, Total	ug/L	P126	ND(1.28)	ND(1.28)	ND(1.28)	ND(1.28)	ND(1.28)	ND(1.28)
Sodium, Total (s)	ug/L		40,300	71,400	50,000	33,700	46,600	48,400
Thallium, Total	ug/L	P127	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)
Tin, Total	ug/L		ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)
Titanium, Total	ug/L		3.00	13.0	4.00	ND(0.253)	4.50	<4.95
Vanadium, Total	ug/L		1.00	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	<0.743
Zinc, Total (e) (s)	ug/L	P128	940	346	601	647	486	604
Aluminum, Dissolved	ug/L		350	287	265	190	221	263
Barium, Dissolved (e)	ug/L		ND(0.0970)	0.560	0.860	ND(0.0970)	ND(0.0970)	<0.342
Boron, Dissolved	ug/L		ND(3.37)	ND(3.37)	ND(3.37)	ND(3.37)	ND(3.37)	ND(3.37)
Calcium, Dissolved (s)	ug/L		5,200	2,200	2,820	4,620	6,610	4,290
Chromium, Dissolved	ug/L	P119	ND(1.68)	2.20	1.90	ND(1.68)	3.40	<2.17
Cobalt, Dissolved (s)	ug/L		ND(0.914)	ND(0.914)	ND(0.914)	2.80	1.80	<1.47
Copper, Dissolved (e) (s)	ug/L	P120	317	617	321	468	588	462
Iron, Dissolved (s)	ug/L		ND(19.8)	ND(19.8)	ND(19.8)	34.8	174	<53.7
Lead, Dissolved (e)	ug/L	P122	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)	3.90	<3.24
Magnesium, Dissolved (s)	ug/L		818	572	514	419	1,030	671

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=2]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-3 (Continued)

Analyte	Unit	Priority Pollutant Code	Accommodations (SP-3) (a) Day 1	Accommodations (SP-3) (a) Day 2	Accommodations (SP-3) (a) Day 3	Accommodations (SP-3) (a) Day 4	Accommodations (SP-3) (a) Day 5	Average Accommodations (SP-3) (a)
Manganese, Dissolved (e) (s)	ug/L		11.1	5.00	5.60	6.00	7.10	6.96
Mercury, Dissolved (e) (s)	ug/L	P123	0.160	ND(0.0170)	0.0300	0.220	0.220	<0.129
Nickel, Dissolved (s)	ug/L	P124	13.5	10.1	10.6	12.2	17.3	12.7
Selenium, Dissolved	ug/L	P125	0.920	ND(0.572)	ND(0.572)	0.720	0.780	<0.713
Sodium, Dissolved (s)	ug/L		38,700	66,400	48,500	33,300	44,100	46,200
Thallium, Dissolved (e)	ug/L	P127	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)
Tin, Dissolved	ug/L		ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)
Titanium, Dissolved	ug/L		ND(0.253)	ND(0.253)	ND(0.253)	ND(10.0)	ND(10.0)	ND(4.15)
Vanadium, Dissolved	ug/L		ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)
Zinc, Dissolved (e) (s)	ug/L	P128	681	259	412	330	336	404
<b>Volatile and Semivolatile Organics</b>								
Bis(2-ethylhexyl) Phthalate	ug/L	P066	19.6	16.7	33.0	15.1	26.8	22.2
Chloroform	ug/L	P023	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Methylene Chloride	ug/L	P044	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Phenol (s)	ug/L	P065	106	ND(14.0)	111	71.5	83.5	<77.2
Tetrachloroethene	ug/L	P085	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Toluene	ug/L	P086	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)

(a) Sampling point location; see Figure 2-1.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with two grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=2]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-4**

**Average Graywater Analytical Results, Island Princess**

Average analytical results for galley, laundry, and accommodations wastewater from results presented in Tables 4-1 to 4-3. See Appendices A-1 and A-2 for all analytical results (detected and nondetected). Priority pollutants (designated by EPA in 40 CFR Part 423, Appendix A) are listed where applicable in the left-most column.

Analyte	Unit	Priority Pollutant Code	Galley Wastewater (SP-1) (a)	Laundry Wastewater (SP-2) (a)	Accommodations Wastewater (SP-3) (a)
<b>Pathogen Indicators</b>					
<i>E. coli</i>	MPN/100 mL		854,000	<22.5	<17,200
Enterococci	MPN/100 mL		> 13,900	# 486	# 966
Fecal Coliform	CFU/100 mL		104,000,000	<965	<175,000
<b>Classical Pollutants</b>					
Alkalinity	mg/L		<107	62.2	89.8
Ammonia As Nitrogen (NH <sub>3</sub> -N) (s)	mg/L		11.1	1.29	0.430
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L		1,910	100	145
Chemical Oxygen Demand (COD)	mg/L		2,630	380	492
Chloride	mg/L		406	33.4	16.2
Hardness (s)	mg/L		145	25.2	25.1
Hexane Extractable Material (HEM)	mg/L		279	7.73	16.1
Nitrate/Nitrite (NO <sub>2</sub> -N + NO <sub>3</sub> -N)	mg/L		<0.0840	0.150	<0.0700
Settleable residue	mL/L		16.7	<1.73	<0.533
Silica Gel Treated HEM (SGT-HEM)	mg/L		ND(4.96)	ND(4.88)	ND(4.76)
Sulfate	mg/L		95.4	20.6	17.0
Total Dissolved Solids (TDS)	mg/L		1,720	256	217

(a) Sampling point location; see Figure 2-1.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-4 (Continued)

Analyte	Unit	Priority Pollutant Code	Galley Wastewater (SP-1) (a)	Laundry Wastewater (SP-2) (a)	Accommodations Wastewater (SP-3) (a)
Total Kjeldahl Nitrogen (TKN) (s)	mg/L		62.3	<8.90	6.82
Total Organic Carbon (TOC)	mg/L		499	78.7	53.0
Total Phosphorus	mg/L		23.8	8.30	0.766
Total Suspended Solids (TSS)	mg/L		979	62.2	83.2
<b>Total and Dissolved Metals</b>					
Aluminum, Total	ug/L		1,240	166	7,110
Antimony, Total	ug/L	P114	ND(5.97)	ND(5.97)	ND(5.97)
Barium, Total (e)	ug/L		34.6	22.5	18.5
Beryllium, Total (e)	ug/L	P117	ND(0.0540)	ND(0.0540)	<0.0812
Boron, Total	ug/L		<157	ND(3.37)	<89.0
Cadmium, Total	ug/L	P118	<0.584	ND(0.446)	ND(0.446)
Calcium, Total (s)	ug/L		22,100	8,900	8,680
Chromium, Total	ug/L	P119	<7.28	5.02	<3.10
Cobalt, Total	ug/L		<0.931	<0.931	<0.931
Copper, Total (s)	ug/L	P120	620	325	580
Iron, Total	ug/L		703	230	179
Lead, Total (e)	ug/L	P122	<6.90	11.9	5.76
Magnesium, Total (s)	ug/L		21,800	710	823
Manganese, Total (e)	ug/L		41.2	3.96	6.52
Mercury, Total (e) (s)	ug/L	P123	<0.0822	0.0840	0.0960
Nickel, Total	ug/L	P124	27.0	7.86	12.4

(a) Sampling point location; see Figure 2-1.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-4 (Continued)**

Analyte	Unit	Priority Pollutant Code	Galley Wastewater (SP-1) (a)	Laundry Wastewater (SP-2) (a)	Accommodations Wastewater (SP-3) (a)
Selenium, Total (s)	ug/L	P125	15.2	<1.27	<0.673
Silver, Total	ug/L	P126	ND(1.28)	<4.10	ND(1.28)
Sodium, Total (s)	ug/L		309,000	48,300	48,400
Thallium, Total	ug/L	P127	<0.0114	ND(0.00900)	ND(0.00900)
Tin, Total	ug/L		25.7	ND(3.45)	ND(3.45)
Titanium, Total	ug/L		<3.45	<4.97	<4.95
Vanadium, Total	ug/L		ND(0.679)	ND(0.679)	<0.743
Zinc, Total (e) (s)	ug/L	P128	1,090	470	604
Aluminum, Dissolved	ug/L		583	<52.6	263
Barium, Dissolved (e)	ug/L		15.7	10.5	<0.342
Boron, Dissolved	ug/L		<86.1	ND(3.37)	ND(3.37)
Calcium, Dissolved (s)	ug/L		19,700	8,060	4,290
Chromium, Dissolved	ug/L	P119	<3.34	ND(1.68)	<2.17
Cobalt, Dissolved (s)	ug/L		4.84	2.68	<1.47
Copper, Dissolved (e) (s)	ug/L	P120	479	242	462
Iron, Dissolved (s)	ug/L		360	<33.3	<53.7
Lead, Dissolved (e)	ug/L	P122	<4.95	<5.60	<3.24
Magnesium, Dissolved (s)	ug/L		20,800	670	671
Manganese, Dissolved (e) (s)	ug/L		17.0	5.40	6.96
Mercury, Dissolved (e) (s)	ug/L	P123	0.0620	0.0780	<0.129
Nickel, Dissolved (s)	ug/L	P124	24.3	4.70	12.7

(a) Sampling point location; see Figure 2-1.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-4 (Continued)**

Analyte	Unit	Priority Pollutant Code	Galley Wastewater (SP-1) (a)	Laundry Wastewater (SP-2) (a)	Accommodations Wastewater (SP-3) (a)
Selenium, Dissolved	ug/L	P125	15.3	<0.698	<0.713
Sodium, Dissolved (s)	ug/L		294,000	47,900	46,200
Thallium, Dissolved (e)	ug/L	P127	<0.00960	ND(0.00900)	ND(0.00900)
Tin, Dissolved	ug/L		<15.0	ND(3.45)	ND(3.45)
Titanium, Dissolved	ug/L		<5.14	ND(4.15)	ND(4.15)
Vanadium, Dissolved	ug/L		<1.49	ND(0.679)	ND(0.679)
Zinc, Dissolved (e) (s)	ug/L	P128	956	339	404
<b>Volatile and Semivolatile Organics</b>					
Bis(2-ethylhexyl) Phthalate	ug/L	P066	<200	92.6	22.2
Chloroform	ug/L	P023	<10.7	101	ND(10.0)
Methylene Chloride	ug/L	P044	ND(10.0)	ND(10.0)	ND(10.0)
Phenol (s)	ug/L	P065	97.5	93.2	<77.2
Tetrachloroethene	ug/L	P085	ND(10.0)	ND(10.0)	ND(10.0)
Toluene	ug/L	P086	ND(10.0)	ND(10.0)	ND(10.0)
<b>Pesticides</b>					
Simazine	ug/L		ND(8.00)	NC	NC

(a) Sampling point location; see Figure 2-1.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

# - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results) and at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-5

### Comparison of Galley, Laundry, and Food Pulper Wastewater During Overboard Discharge, Island Princess

Average analytical results for galley and laundry wastewater during overboard discharge for analytes detected at least once during the sampling episode. See Appendices A-1 and A-2 for all analytical results (detected and nondetected). Priority pollutants (designated by EPA in 40 CFR Part 423, Appendix A) are listed where applicable.

Analyte	Unit	Priority Pollutant Code	Galley Overboard Discharge (SP-8) (a)	Laundry Overboard Discharge (SP-9) (a)	Food Pulper Overboard (SP-10) (a)
<b>Pathogen Indicators</b>					
<i>E. coli</i>	MPN/100 mL		EXCLUDE	EXCLUDE	EXCLUDE
Enterococci	MPN/100 mL		EXCLUDE	EXCLUDE	EXCLUDE
Fecal Coliform	CFU/100 mL		EXCLUDE	EXCLUDE	EXCLUDE
<b>Classical Pollutants</b>					
Alkalinity	mg/L		90.0	90.0	ND(10.0)
Ammonia As Nitrogen (NH <sub>3</sub> -N) (s)	mg/L		2.72	2.32	35.0
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L		976	85.4	2,160
Chemical Oxygen Demand (COD)	mg/L		1,270	234	2,150
Chloride	mg/L		83.0	142	973
Hardness (s)	mg/L		36.7	65.5	676
Hexane Extractable Material (HEM)	mg/L		150	19.5	194
Nitrate/Nitrite (NO <sub>2</sub> -N + NO <sub>3</sub> -N)	mg/L		ND(0.0500)	0.0600	ND(0.0500)
Settleable residue	mL/L		1.50	6.00	10.0
Silica Gel Treated HEM (SGT-HEM)	mg/L		ND(4.20)	ND(4.00)	ND(3.90)
Sulfate	mg/L		21.0	14.0	86.0
Total Dissolved Solids (TDS)	mg/L		666	394	2,720
Total Kjeldahl Nitrogen (TKN) (s)	mg/L		21.8	7.50	98.7

(a) Sampling point location; see Figure 2-1.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

**Table 4-5 (Continued)**

Analyte	Unit	Priority Pollutant Code	Galley Overboard Discharge (SP-8) (a)	Laundry Overboard Discharge (SP-9) (a)	Food Pulper Overboard (SP-10) (a)
Total Organic Carbon (TOC)	mg/L		268	38.8	848
Total Phosphorus	mg/L		19.4	5.80	17.7
Total Suspended Solids (TSS)	mg/L		308	77.0	242
<b>Total and Dissolved Metals</b>					
Aluminum, Total	ug/L		735	321	404
Antimony, Total	ug/L	P114	ND(5.97)	ND(5.97)	6.00
Barium, Total (e)	ug/L		11.0	15.0	14.6
Beryllium, Total (e)	ug/L	P117	ND(0.0540)	ND(0.0540)	ND(0.0540)
Boron, Total	ug/L		ND(3.37)	ND(3.37)	526
Cadmium, Total	ug/L	P118	ND(0.446)	ND(0.446)	1.10
Calcium, Total (s)	ug/L		9,310	11,400	61,100
Chromium, Total	ug/L	P119	9.00	4.00	23.5
Cobalt, Total	ug/L		1.00	1.00	2.70
Copper, Total (s)	ug/L	P120	259	217	118
Iron, Total	ug/L		602	570	59,100
Lead, Total (e)	ug/L	P122	3.40	4.00	ND(3.08)
Magnesium, Total (s)	ug/L		3,270	8,990	127,000
Manganese, Total (e)	ug/L		17.0	8.00	260
Mercury, Total (e) (s)	ug/L	P123	0.110	ND(0.0170)	0.0900
Nickel, Total	ug/L	P124	14.0	10.0	19.7
Selenium, Total (s)	ug/L	P125	ND(0.572)	ND(0.572)	49.3
Silver, Total	ug/L	P126	ND(1.28)	3.00	ND(1.28)

(a) Sampling point location; see Figure 2-1.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

Table 4-5 (Continued)

Analyte	Unit	Priority Pollutant Code	Galley Overboard Discharge (SP-8) (a)	Laundry Overboard Discharge (SP-9) (a)	Food Pulper Overboard (SP-10) (a)
Sodium, Total (s)	ug/L		104,000	98,500	954,000
Thallium, Total	ug/L	P127	ND(0.00900)	ND(0.00900)	0.0100
Tin, Total	ug/L		10.0	ND(3.45)	7.00
Titanium, Total	ug/L		2.00	2.00	ND(0.253)
Vanadium, Total	ug/L		1.00	ND(0.679)	ND(0.679)
Zinc, Total (e) (s)	ug/L	P128	616	295	20,300
Aluminum, Dissolved	ug/L		456	71.8	86.1
Barium, Dissolved (e)	ug/L		6.10	11.1	15.2
Boron, Dissolved	ug/L		ND(3.37)	ND(3.37)	ND(3.37)
Calcium, Dissolved (s)	ug/L		8,330	8,940	66,900
Chromium, Dissolved	ug/L	P119	2.50	ND(1.68)	7.70
Cobalt, Dissolved (s)	ug/L		ND(0.914)	ND(0.914)	4.10
Copper, Dissolved (e) (s)	ug/L	P120	25.4	151	4.40
Iron, Dissolved (s)	ug/L		506	ND(19.8)	15,300
Lead, Dissolved (e)	ug/L	P122	ND(3.08)	ND(3.08)	ND(3.08)
Magnesium, Dissolved (s)	ug/L		2,680	4,550	30,300
Manganese, Dissolved (e) (s)	ug/L		23.0	5.50	114
Mercury, Dissolved (e) (s)	ug/L	P123	0.0200	ND(0.0170)	0.0700
Nickel, Dissolved (s)	ug/L	P124	11.9	5.50	27.0
Selenium, Dissolved	ug/L	P125	1.60	1.20	32.4
Sodium, Dissolved (s)	ug/L		103,000	77,600	240,000
Thallium, Dissolved (e)	ug/L	P127	ND(0.00900)	ND(0.00900)	ND(0.00900)

(a) Sampling point location; see Figure 2-1.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

**Table 4-5 (Continued)**

Analyte	Unit	Priority Pollutant Code	Galley Overboard Discharge (SP-8) (a)	Laundry Overboard Discharge (SP-9) (a)	Food Pulper Overboard (SP-10) (a)
Tin, Dissolved	ug/L		5.80	ND(3.45)	5.10
Titanium, Dissolved	ug/L		ND(0.253)	ND(0.253)	ND(10.0)
Vanadium, Dissolved	ug/L		ND(0.679)	ND(0.679)	ND(0.679)
Zinc, Dissolved (e) (s)	ug/L	P128	465	150	139,000
<b>Volatile and Semivolatile Organics</b>					
Bis(2-ethylhexyl) Phthalate	ug/L	P066	110	28.2	ND(10.0)
Bromomethane	ug/L	P046	ND(10.0)	ND(10.0)	
Chloroform	ug/L	P023	ND(10.0)	117	ND(10.0)
Methylene Chloride	ug/L	P044	ND(10.0)	ND(10.0)	ND(10.0)
Phenol (s)	ug/L	P065	114	94.9	ND(10.0)
Tetrachloroethene	ug/L	P085	ND(10.0)	ND(10.0)	ND(10.0)
Toluene	ug/L	P086	ND(10.0)	ND(10.0)	ND(10.0)

(a) Sampling point location; see Figure 2-1.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

Table 4-6

## Influent to Treatment Analytical Results, Island Princess

Analytical results for the influent to treatment system for analytes detected at least once in wastewater samples during the sampling episode. See Appendices A-1 and A-2 for all analytical results (detected and nondetected). Influent to treatment system samples were collected for five consecutive 24-hour periods; see Section 3.2 for the sample collection methodology. Figure 2-2 identifies the sampling point location. Average influent to treatment system concentrations determined from the daily results. Priority pollutants (designated by EPA in 40 CFR Part 423, Appendix A) are identified where applicable.

Analyte	Unit	Priority Pollutant Code	Influent to Treatment (SP-4) (a) Day 1	Influent to Treatment (SP-4) (a) Day 2	Influent to Treatment (SP-4) (a) Day 3	Influent to Treatment (SP-4) (a) Day 4	Influent to Treatment (SP-4) (a) Day 5	Average Influent to Treatment (SP-4) (a)
<b>Pathogen Indicators</b>								
<i>E. coli</i> (b)	MPN/100 mL		>19,000,000 [N=3]	23,900,000 [N=3]	22,500,000 [N=3]	>87,600,000 [N=3]	29,800,000 [N=3]	>36,600,000
Enterococci (b)	MPN/100 mL		> 10,400,000 [N=3]	11,100,000 [N=3]	7,220,000 [N=3]	36,500,000 [N=3]	18,700,000 [N=3]	>16,800,000
Fecal Coliform (b)	CFU/100 mL		23,400,000 [N=3]	503,000,000 [N=3]	341,000,000 [N=3]	61,600,000 [N=3]	21,400,000 [N=3]	190,000,000
<b>Classical Pollutants</b>								
Alkalinity	mg/L		580	354	376	293	377	396
Ammonia As Nitrogen (NH <sub>3</sub> -N) (s)	mg/L		139	69.6	84.6	97.6	80.2	94.2
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L		338	224	409	329	EXCLUDE	325
Chemical Oxygen Demand (COD)	mg/L		1,560	1,430	667	546	577	956
Chloride	mg/L		1,530	852	1,180	602	527	938
Hardness (s)	mg/L		573	346	563	269	258	402
Hexane Extractable Material (HEM)	mg/L		131	59.2	70.9	117	269	129
Nitrate/Nitrite (NO <sub>2</sub> -N + NO <sub>3</sub> -N)	mg/L		0.0600	0.100	ND(0.0500)	ND(0.0500)	ND(0.0500)	<0.0620
Settleable residue	mL/L		1.10	2.60	93.0	65.0	EXCLUDE	40.4

(a) Sampling point location; see Figure 2-2.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples collected per 24-hour sampling period (some fecal coliform results were excluded; see Section 5.1). Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(c) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-6 (Continued)

Analyte	Unit	Priority Pollutant Code	Influent to Treatment (SP-4) (a) Day 1	Influent to Treatment (SP-4) (a) Day 2	Influent to Treatment (SP-4) (a) Day 3	Influent to Treatment (SP-4) (a) Day 4	Influent to Treatment (SP-4) (a) Day 5	Average Influent to Treatment (SP-4) (a)
Silica Gel Treated HEM (SGT-HEM)	mg/L		72.0	17.0	42.7	55.7	124	62.3
Sulfate	mg/L		204	127	138	93.0	107	134
Total Dissolved Solids (TDS)	mg/L		2,880	1,660	2,370	1,300	1,030	1,850
Total Kjeldahl Nitrogen (TKN) (s)	mg/L		354	120	194	110	125	181
Total Organic Carbon (TOC)	mg/L		250	172	104	79.4	96.9	140
Total Phosphorus	mg/L		71.6	18.2	18.2	16.8	16.6	28.3
Total Suspended Solids (TSS)	mg/L		1,560	1,470	907	960	860	1,150
<b>Total and Dissolved Metals</b>								
Aluminum, Total	ug/L		6,850	8,180	4,670	3,330	3,330	5,270
Antimony, Total	ug/L	P114	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)
Barium, Total (e)	ug/L		76.0	74.0	44.0	29.0	42.7	53.1
Beryllium, Total (e)	ug/L	P117	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)
Boron, Total	ug/L		467	287	496	292	322	373
Cadmium, Total	ug/L	P118	1.00	1.00	2.00	0.650	ND(0.446)	<1.02
Calcium, Total (s)	ug/L		56,200	39,900	57,100	32,200	35,300	44,100
Chromium, Total	ug/L	P119	10.0	14.0	12.0	8.70	7.30	10.4
Cobalt, Total	ug/L		ND(0.914)	ND(0.914)	ND(0.914)	ND(0.914)	ND(0.914)	ND(0.914)
Copper, Total (s)	ug/L	P120	1,330	1,580	924	755	1,280	1,170
Iron, Total	ug/L		1,450	1,670	1,060	694	945	1,160
Lead, Total (e)	ug/L	P122	21.0	21.0	26.0	14.2	14.8	19.4

(a) Sampling point location; see Figure 2-2.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples collected per 24-hour sampling period (some fecal coliform results were excluded; see Section 5.1). Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-6 (Continued)

Analyte	Unit	Priority Pollutant Code	Influent to Treatment (SP-4) (a) Day 1	Influent to Treatment (SP-4) (a) Day 2	Influent to Treatment (SP-4) (a) Day 3	Influent to Treatment (SP-4) (a) Day 4	Influent to Treatment (SP-4) (a) Day 5	Average Influent to Treatment (SP-4) (a)
Magnesium, Total (s)	ug/L		105,000	59,800	102,000	45,800	41,200	70,800
Manganese, Total (e)	ug/L		108	81.0	88.0	56.4	67.4	80.2
Mercury, Total (e) (s)	ug/L	P123	1.00	0.360	0.290	0.280	0.280	0.442
Nickel, Total	ug/L	P124	26.0	23.0	46.0	20.9	22.3	27.6
Selenium, Total (s)	ug/L	P125	50.0	33.0	44.0	26.0	18.4	34.3
Silver, Total	ug/L	P126	3.00	2.00	3.00	ND(1.28)	ND(1.28)	<2.11
Sodium, Total (s)	ug/L		792,000	446,000	612,000	331,000	281,000	492,000
Thallium, Total	ug/L	P127	ND(0.00900)	ND(0.00900)	ND(0.00900)	0.0100	0.0100	<0.00940
Tin, Total	ug/L		7.00	10.0	15.0	12.9	31.7	15.3
Titanium, Total	ug/L		ND(0.253)	4.00	3.00	2.40	3.30	<2.59
Vanadium, Total	ug/L		15.0	11.0	21.0	6.10	5.10	11.6
Zinc, Total (e) (s)	ug/L	P128	2,350	1,880	1,090	902	950	1,430
Aluminum, Dissolved	ug/L		129	119	106	96.5	130	116
Barium, Dissolved (e)	ug/L		6.00	3.60	4.40	2.80	5.60	4.48
Boron, Dissolved	ug/L		442	289	369	ND(3.37)	ND(3.37)	<221
Calcium, Dissolved (s)	ug/L		37,800	24,400	33,400	20,300	20,200	27,200
Chromium, Dissolved	ug/L	P119	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)
Cobalt, Dissolved (s)	ug/L		7.90	ND(0.914)	8.50	8.60	7.00	<6.58
Copper, Dissolved (e) (s)	ug/L	P120	25.2	39.5	31.7	47.3	79.8	44.7
Iron, Dissolved (s)	ug/L		ND(19.8)	ND(19.8)	ND(19.8)	269	115	<88.7

(a) Sampling point location; see Figure 2-2.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples collected per 24-hour sampling period (some fecal coliform results were excluded; see Section 5.1). Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

Table 4-6 (Continued)

Analyte	Unit	Priority Pollutant Code	Influent to Treatment (SP-4) (a) Day 1	Influent to Treatment (SP-4) (a) Day 2	Influent to Treatment (SP-4) (a) Day 3	Influent to Treatment (SP-4) (a) Day 4	Influent to Treatment (SP-4) (a) Day 5	Average Influent to Treatment (SP-4) (a)
Lead, Dissolved (e)	ug/L	P122	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)
Magnesium, Dissolved (s)	ug/L		91,500	51,900	71,600	37,000	29,700	56,300
Manganese, Dissolved (e) (s)	ug/L		25.9	13.1	28.6	23.2	19.3	22.0
Mercury, Dissolved (e) (s)	ug/L	P123	ND(0.0170)	ND(0.0170)	0.0300	0.0700	0.0500	<0.0368
Nickel, Dissolved (s)	ug/L	P124	11.3	11.4	22.8	20.0	13.1	15.7
Selenium, Dissolved	ug/L	P125	42.9	25.7	32.8	24.8	22.6	29.8
Sodium, Dissolved (s)	ug/L		821,000	451,000	471,000	310,000	269,000	464,000
Thallium, Dissolved (e)	ug/L	P127	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)
Tin, Dissolved	ug/L		ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)
Titanium, Dissolved	ug/L		ND(0.253)	ND(0.253)	ND(0.253)	ND(10.0)	ND(10.0)	ND(4.15)
Vanadium, Dissolved	ug/L		ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)	ND(0.679)
Zinc, Dissolved (e) (s)	ug/L	P128	83.4	119	91.6	104	102	100
<b>Volatile and Semivolatile Organics</b>								
Bis(2-ethylhexyl) Phthalate	ug/L	P066	29.0	23.7	58.1	26.6	22.2	31.9
Chloroform	ug/L	P023	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Methylene Chloride	ug/L	P044	ND(10.0)	ND(10.0)	10.5	ND(10.0)	ND(10.0)	<10.1
Phenol (s)	ug/L	P065	244	127	140	111	122	149
Tetrachloroethene	ug/L	P085	28.7	29.2	ND(10.0)	11.3	ND(10.0)	<17.8
Toluene	ug/L	P086	ND(10.0)	ND(10.0)	10.7	ND(10.0)	ND(10.0)	<10.1

(a) Sampling point location; see Figure 2-2.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples collected per 24-hour sampling period (some fecal coliform results were excluded; see Section 5.1). Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-6 (Continued)**

Analyte	Unit	Priority Pollutant Code	Influent to Treatment (SP-4) (a) Day 1	Influent to Treatment (SP-4) (a) Day 2	Influent to Treatment (SP-4) (a) Day 3	Influent to Treatment (SP-4) (a) Day 4	Influent to Treatment (SP-4) (a) Day 5	Average Influent to Treatment (SP-4) (a)
<b>Pesticides</b>								
Simazine	ug/L		NC	NC	0.960	NC	NC	
<b>Polychlorinated Biphenyls</b>								
PCB-2	pg/L		42.5	NC	NC	NC	NC	
PCB-6	pg/L		156	NC	NC	NC	NC	
PCB-8	pg/L		807	NC	NC	NC	NC	
PCB-11	pg/L		1,240	NC	NC	NC	NC	
PCB-16	pg/L		905	NC	NC	NC	NC	
PCB-17	pg/L		849	NC	NC	NC	NC	
PCB-18+PCB-30	pg/L		1,750	NC	NC	NC	NC	
PCB-19	pg/L		176	NC	NC	NC	NC	
PCB-20+PCB-28	pg/L		2,680	NC	NC	NC	NC	
PCB-21+PCB-33	pg/L		1,640	NC	NC	NC	NC	
PCB-22	pg/L		1,060	NC	NC	NC	NC	
PCB-26+PCB-29	pg/L		474	NC	NC	NC	NC	
PCB-31	pg/L		2,410	NC	NC	NC	NC	
PCB-32	pg/L		505	NC	NC	NC	NC	
PCB-35	pg/L		235	NC	NC	NC	NC	
PCB-37	pg/L		773	NC	NC	NC	NC	
PCB-40+PCB-41+PCB-71	pg/L		1,170	NC	NC	NC	NC	

(a) Sampling point location; see Figure 2-2.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples collected per 24-hour sampling period (some fecal coliform results were excluded; see Section 5.1). Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(c) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-6 (Continued)**

Analyte	Unit	Priority Pollutant Code	Influent to Treatment (SP-4) (a) Day 1	Influent to Treatment (SP-4) (a) Day 2	Influent to Treatment (SP-4) (a) Day 3	Influent to Treatment (SP-4) (a) Day 4	Influent to Treatment (SP-4) (a) Day 5	Average Influent to Treatment (SP-4) (a)
PCB-42	pg/L		537	NC	NC	NC	NC	
PCB-44+PCB-47+PCB-65	pg/L		2,820	NC	NC	NC	NC	
PCB-45+PCB-51	pg/L		551	NC	NC	NC	NC	
PCB-48	pg/L		473	NC	NC	NC	NC	
PCB-49+PCB-69	pg/L		1,020	NC	NC	NC	NC	
PCB-50+PCB-53	pg/L		250	NC	NC	NC	NC	
PCB-52	pg/L		1,610	NC	NC	NC	NC	
PCB-56	pg/L		810	NC	NC	NC	NC	
PCB-61+PCB-70+PCB-74+PCB-76	pg/L		2,990	NC	NC	NC	NC	
PCB-64	pg/L		786	NC	NC	NC	NC	
PCB-66	pg/L		1,460	NC	NC	NC	NC	
PCB-83+PCB-99	pg/L		768	NC	NC	NC	NC	
PCB-86+PCB-87+PCB-97+PCB-108+P	pg/L		660	NC	NC	NC	NC	
PCB-93+PCB-95+PCB-98+PCB-100+P	pg/L		713	NC	NC	NC	NC	
PCB-105	pg/L		406	NC	NC	NC	NC	
PCB-118	pg/L		984	NC	NC	NC	NC	
PCB-129+PCB-138+PCB-160+PCB-163	pg/L		1,650	NC	NC	NC	NC	
PCB-153+PCB-168	pg/L		1,740	NC	NC	NC	NC	

(a) Sampling point location; see Figure 2-2.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples collected per 24-hour sampling period (some fecal coliform results were excluded; see Section 5.1). Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(c) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(d) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-6 (Continued)**

Analyte	Unit	Priority Pollutant Code	Influent to Treatment (SP-4) (a) Day 1	Influent to Treatment (SP-4) (a) Day 2	Influent to Treatment (SP-4) (a) Day 3	Influent to Treatment (SP-4) (a) Day 4	Influent to Treatment (SP-4) (a) Day 5	Average Influent to Treatment (SP-4) (a)
PCB-180+PCB-193	pg/L		986	NC	NC	NC	NC	
Total Dichloro Biphenyls	pg/L		2,200	NC	NC	NC	NC	
Total Hexachloro Biphenyls	pg/L		3,390	NC	NC	NC	NC	
Total PCBs	pg/L		37,100	NC	NC	NC	NC	
Total Pentachloro Biphenyls	pg/L		3,530	NC	NC	NC	NC	
Total Tetrachloro Biphenyls	pg/L		14,500	NC	NC	NC	NC	
Total Trichloro Biphenyls	pg/L		13,500	NC	NC	NC	NC	

(a) Sampling point location; see Figure 2-2.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples collected per 24-hour sampling period (some fecal coliform results were excluded; see Section 5.1). Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(c) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

NC - Not collected.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-7**

**Influent to UV Disinfection Analytical Results, Island Princess**

Analytical results for the influent to UV disinfection part of the wastewater treatment system. Influent to UV disinfection samples were collected for five consecutive 24-hour sampling periods; see Section 3.2 for the sample collection methodology. Figure 2-2 identifies sampling point location. Average influent to UV concentrations determined from the daily results.

Analyte	Unit	Influent to UV Disinfection (SP-5) (a) Day 1	Influent to UV Disinfection (SP-5) (a) Day 2	Influent to UV Disinfection (SP-5) (a) Day 3	Influent to UV Disinfection (SP-5) (a) Day 4	Influent to UV Disinfection (SP-5) (a) Day 5	Average Influent to UV Disinfection (SP-5) (a)
<b>Pathogen Indicators</b>							
<i>E. coli</i> (b)	MPN/100 mL	< 1.00 [N=3]	ND(1.00) [N=3]	ND(1.00) [N=3]	ND(1.00) [N=3]	< 1.00 [N=3]	<1.00
Enterococci (b)	MPN/100 mL	< 1.00 [N=3]	< 1.00 [N=3]	ND(1.00) [N=3]	ND(1.00) [N=3]	< 10.0 [N=3]	<2.80
Fecal Coliform (b)	CFU/100 mL	ND(4.67) [N=3]	ND(2.00) [N=3]	ND(2.00) [N=3]	ND(2.00) [N=3]	< 2.00 [N=3]	<2.53

(a) Sampling point location; see Figure 2-2.

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples collected per 24-hour sampling period. Results are reported as an average for each 24-hour period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

Table 4-8

## Effluent from Treatment Analytical Results, Island Princess

Analytical results for the effluent from treatment system for analytes detected at least once in wastewater samples during the sampling episode. See Appendices A-1 and A-2 for all analytical results (detected and nondetected). Effluent from treatment system samples were collected for five consecutive 24-hour periods; see Section 3.2 for the sample collection methodology. Figure 2-2 identifies the sampling point location. Average effluent from treatment concentrations determined from the daily results. Priority pollutants (designated by EPA in 40 CFR Part 423, Appendix A) are identified where applicable.

Analyte	Unit	Priority Pollutant Code	Effluent from Treatment (SP-6) (a) Day 1	Effluent from Treatment (SP-6) (a) Day 2	Effluent from Treatment (SP-6) (a) Day 3	Effluent from Treatment (SP-6) (a) Day 4	Effluent from Treatment (SP-6) (a) Day 5	Average Effluent from Treatment (SP-6) (a)
<b>Pathogen Indicators</b>								
<i>E. coli</i> (b)	MPN/100 mL		< 1.70 [N=3]	ND(1.00) [N=3]	ND(1.00) [N=3]	<1.00 [N=3]	ND(1.00) [N=3]	<1.14
Enterococci (b)	MPN/100 mL		< 1.00 [N=3]	ND(1.00) [N=3]	ND(1.00) [N=3]	< 1.70 [N=3]	< 1.33 [N=3]	<1.21
Fecal Coliform (b)	CFU/100 mL		< 8.00 [N=3]	ND(2.00) [N=3]	ND(2.00) [N=3]	ND(2.00) [N=3]	ND(2.00) [N=3]	<3.20
<b>Classical Pollutants</b>								
Alkalinity	mg/L		150	219	215	191	204	196
Ammonia As Nitrogen (NH <sub>3</sub> -N) (s)	mg/L		27.9	41.1	47.3	38.1	42.6	39.4
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L		ND(2.00)	ND(2.00)	7.85	ND(2.00)	EXCLUDE	<3.46
Chemical Oxygen Demand (COD)	mg/L		56.0	61.0	73.5	64.5	67.0	64.4
Chloride	mg/L		915	1,210	1,320	952	792	1,040
Hardness (s)	mg/L		310	359	437	329	274	342
Hexane Extractable Material (HEM)	mg/L		ND(5.10)	ND(5.10)	ND(4.80)	ND(5.00)	ND(4.80)	ND(4.96)
Nitrate/Nitrite (NO <sub>2</sub> -N + NO <sub>3</sub> -N)	mg/L		0.0500	0.230	ND(0.0500)	ND(0.0500)	ND(0.0500)	<0.0860
Settleable residue	mL/L		ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	EXCLUDE	ND(0.100)
Silica Gel Treated HEM (SGT-HEM)	mg/L		ND(5.10)	ND(5.10)	ND(4.80)	ND(5.00)	ND(4.80)	ND(4.96)
Sulfate	mg/L		124	166	180	129	110	142
Total Dissolved Solids (TDS)	mg/L		1,750	2,300	2,600	1,690	1,580	1,980

(a) Sampling point location; see Figure 2-2

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples per 24-hour sampling period. Results are reported as an average for each 24-hour sampling period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value.

**Table 4-8 (Continued)**

Analyte	Unit	Priority Pollutant Code	Effluent from Treatment (SP-6) (a) Day 1	Effluent from Treatment (SP-6) (a) Day 2	Effluent from Treatment (SP-6) (a) Day 3	Effluent from Treatment (SP-6) (a) Day 4	Effluent from Treatment (SP-6) (a) Day 5	Average Effluent from Treatment (SP-6) (a)
Total Kjeldahl Nitrogen (TKN) (s)	mg/L		27.6	45.0	53.2	43.8	46.4	43.2
Total Organic Carbon (TOC)	mg/L		17.2	13.9	16.5	14.7	15.2	15.5
Total Phosphorus	mg/L		6.20	6.30	8.10	7.45	8.25	7.26
Total Suspended Solids (TSS)	mg/L		ND(5.00)	ND(5.00)	ND(5.00)	ND(5.00)	< 18.5	<7.70
<b>Total and Dissolved Metals</b>								
Aluminum, Total	ug/L		< 19.0	48.5	38.0	ND(9.93)	ND(9.93)	<25.1
Antimony, Total	ug/L	P114	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)	ND(5.97)
Barium, Total (e)	ug/L		6.00	6.00	6.00	4.40	4.40	5.36
Beryllium, Total (e)	ug/L	P117	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)	ND(0.0540)
Boron, Total	ug/L		317	346	400	347	333	348
Cadmium, Total	ug/L	P118	ND(0.446)	ND(0.446)	ND(0.446)	ND(0.446)	ND(0.446)	ND(0.446)
Calcium, Total (s)	ug/L		28,800	31,900	39,500	31,300	28,800	32,000
Chromium, Total	ug/L	P119	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)
Cobalt, Total	ug/L		ND(0.914)	< 0.957	ND(0.914)	ND(0.914)	ND(0.914)	<0.923
Copper, Total (s)	ug/L	P120	15.2	18.5	15.0	15.3	27.7	18.3
Iron, Total	ug/L		165	175	176	208	156	176
Lead, Total (e)	ug/L	P122	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)
Magnesium, Total (s)	ug/L		57,900	67,800	82,100	60,800	49,100	63,500
Manganese, Total (e)	ug/L		19.2	19.0	23.0	18.5	17.2	19.4
Mercury, Total (e) (s)	ug/L	P123	0.0250	0.0550	0.0200	0.0300	0.0400	0.0340
Nickel, Total	ug/L	P124	12.6	11.5	20.0	15.6	11.9	14.3
Selenium, Total (s)	ug/L	P125	20.9	27.5	42.0	32.2	28.3	30.2

(a) Sampling point location; see Figure 2-2

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples per 24-hour sampling period. Results are reported as an average for each 24-hour sampling period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value.

Table 4-8 (Continued)

Analyte	Unit	Priority Pollutant Code	Effluent from Treatment (SP-6) (a) Day 1	Effluent from Treatment (SP-6) (a) Day 2	Effluent from Treatment (SP-6) (a) Day 3	Effluent from Treatment (SP-6) (a) Day 4	Effluent from Treatment (SP-6) (a) Day 5	Average Effluent from Treatment (SP-6) (a)
Silver, Total	ug/L	P126	ND(1.28)	ND(1.28)	ND(1.28)	ND(1.28)	ND(1.28)	ND(1.28)
Sodium, Total (s)	ug/L		500,000	583,000	664,000	505,000	413,000	533,000
Thallium, Total	ug/L	P127	< 0.00950	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	<0.00910
Tin, Total	ug/L		ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)
Titanium, Total	ug/L		ND(0.253)	ND(0.253)	ND(0.253)	ND(0.253)	ND(0.253)	ND(0.253)
Vanadium, Total	ug/L		< 0.890	ND(0.679)	ND(0.679)	< 0.755	1.50	<0.900
Zinc, Total (e) (s)	ug/L	P128	222	214	152	226	219	207
Aluminum, Dissolved	ug/L		< 28.2	ND(9.93)	ND(9.93)	49.9	53.7	<30.3
Barium, Dissolved (e)	ug/L		6.05	6.50	5.80	4.55	4.50	5.48
Boron, Dissolved	ug/L		315	366	388	< 169	324	<312
Calcium, Dissolved (s)	ug/L		28,800	33,800	37,900	31,100	29,300	32,200
Chromium, Dissolved	ug/L	P119	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)	ND(1.68)
Cobalt, Dissolved (s)	ug/L		< 1.06	ND(0.914)	ND(0.914)	< 1.46	2.60	<1.39
Copper, Dissolved (e) (s)	ug/L	P120	13.9	17.4	13.1	14.4	25.7	16.9
Iron, Dissolved (s)	ug/L		< 91.4	ND(19.8)	ND(19.8)	158	140	<85.8
Lead, Dissolved (e)	ug/L	P122	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)	ND(3.08)
Magnesium, Dissolved (s)	ug/L		57,500	73,200	78,000	60,700	50,200	63,900
Manganese, Dissolved (e) (s)	ug/L		21.1	23.8	23.1	19.4	21.5	21.8
Mercury, Dissolved (s)	ug/L	P123	< 0.0285	ND(0.0170)	ND(0.0170)	< 0.0235	0.0400	<0.0252
Nickel, Dissolved (s)	ug/L	P124	12.8	11.4	19.3	14.1	12.9	14.0
Selenium, Dissolved	ug/L	P125	32.0	43.6	72.1	29.8	28.4	41.2
Sodium, Dissolved (s)	ug/L		546,000	990,000	674,000	480,000	406,000	619,000

(a) Sampling point location; see Figure 2-2

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples per 24-hour sampling period. Results are reported as an average for each 24-hour sampling period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value.

**Table 4-8 (Continued)**

Analyte	Unit	Priority Pollutant Code	Effluent from Treatment (SP-6) (a) Day 1	Effluent from Treatment (SP-6) (a) Day 2	Effluent from Treatment (SP-6) (a) Day 3	Effluent from Treatment (SP-6) (a) Day 4	Effluent from Treatment (SP-6) (a) Day 5	Average Effluent from Treatment (SP-6) (a)
Thallium, Dissolved (e)	ug/L	P127	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)	ND(0.00900)
Tin, Dissolved	ug/L		ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)	ND(3.45)
Titanium, Dissolved	ug/L		ND(5.13)	ND(0.253)	ND(0.253)	ND(10.0)	ND(10.0)	ND(5.13)
Vanadium, Dissolved	ug/L		< 1.09	ND(0.679)	< 0.890	< 0.695	1.90	<1.05
Zinc, Dissolved (e) (s)	ug/L	P128	223	209	151	222	219	205
<b>Volatile and Semivolatile Organics</b>								
Bis(2-ethylhexyl) Phthalate	ug/L	P066	ND(10.0)	< 13.4	< 14.5	ND(10.0)	ND(10.0)	<11.6
Chloroform	ug/L	P023	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Methylene Chloride	ug/L	P044	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Phenol (s)	ug/L	P065	85.8	68.2	109	79.5	64.9	81.4
Tetrachloroethene	ug/L	P085	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)
Toluene	ug/L	P086	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)	ND(10.0)

(a) Sampling point location; see Figure 2-2

(b) Samples for pathogen indicator analyses were collected as grab samples for individual analysis, with three grab samples per 24-hour sampling period. Results are reported as an average for each 24-hour sampling period, followed by an indication of the number of results included in the average (e.g., [N=3]). See Appendix A-1 for all individual grab sample results.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

EXCLUDE - Data excluded from the data set (see data review narratives in Appendix D for details).

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetect value.

**Table 4-9**

**Wastewater Treatment System: Performance Data for Pathogen Indicators, Island Princess**

Pathogen indicators performance data for the Island's Hamworthy wastewater treatment system. Average analyte concentrations were determined from the daily results presented in Tables 4-6 through 4-8. Percent removals were calculated using the average influent to and effluent from treatment analyte concentrations.

Analyte	Unit	Average Influent to Treatment Concentration (SP-4) (a)	Average Influent to UV Disinfection Concentration (SP-5) (a)	Average Effluent from Treatment Concentration (SP-6) (a)	Percent Removal
<b>Pathogen Indicators</b>					
<i>E. coli</i>	MPN/100 mL	>36,600,000	<1.00	<1.14	> 99
Enterococci	MPN/100 mL	>16,800,000	<2.80	<1.21	> 99
Fecal Coliform	CFU/100 mL	190,000,000	<2.54	<3.20	> 99

(a) Sampling point location; see Figure 2-2.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Average result includes at least one result flagged by the laboratory as ">" because the sample was not diluted sufficiently (see Appendix D).

**Table 4-10**

**Wastewater Treatment System: Performance Data for Analytes Other Than Pathogen Indicators, Island Princess**

Performance data for the Island's Hamworthy wastewater treatment system for analytes other than pathogen indicators detected in either the influent to or effluent from treatment. Range and average analyte concentrations were determined from the daily results presented in Tables 4-6 and 4-8. Percent removals were calculated using the average influent to and effluent from treatment analyte concentrations. Priority pollutants (designated by EPA in 40 CFR Part 423, Appendix A) are identified where applicable.

Analyte	Unit	Priority Pollutant Code	Average Influent to Treatment Concentration (SP-4) (a)	Influent to Treatment Concentration Range (SP-4) (a)	Average Effluent from Treatment Concentration (SP-6) (a)	Effluent from Treatment Concentration Range (SP-6) (a)	Percent Removal
<b>Classical Pollutants</b>							
Alkalinity	mg/L		396	293 - 580	196	150 - 219	51
Ammonia As Nitrogen (NH <sub>3</sub> -N) (s)	mg/L		94.2	69.6 - 139	39.4	27.9 - 47.3	58
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L		325	224 - 409	<3.46	ND(2.00) - 7.85	99
Chemical Oxygen Demand (COD)	mg/L		956	546 - 1,560	64.4	56.0 - 73.5	93
Chloride	mg/L		938	527 - 1,530	1,040	792 - 1,320	NC
Hardness (s)	mg/L		402	258 - 573	342	274 - 437	15
Hexane Extractable Material (HEM)	mg/L		129	59.2 - 269	ND(4.96)	ND(4.80) - ND(5.10)	> 96
Nitrate/Nitrite (NO <sub>2</sub> -N + NO <sub>3</sub> -N)	mg/L		<0.0620	ND(0.0500) - 0.100	<0.0860	ND(0.0500) - 0.230	NC
Settleable residue	mL/L		40.4	1.10 - 93.0	ND(0.100)	ND(0.100)	> 99
Silica Gel Treated HEM (SGT-HEM)	mg/L		62.3	17.0 - 124	ND(4.96)	ND(4.80) - ND(5.10)	> 92
Sulfate	mg/L		134	93.0 - 204	142	110 - 180	NC
Total Dissolved Solids (TDS)	mg/L		1,850	1,030 - 2,880	1,980	1,580 - 2,600	NC
Total Kjeldahl Nitrogen (TKN) (s)	mg/L		181	110 - 354	43.2	27.6 - 53.2	76
Total Organic Carbon (TOC)	mg/L		140	79.4 - 250	15.5	13.9 - 17.2	89
Total Phosphorus	mg/L		28.3	16.6 - 71.6	7.26	6.20 - 8.25	74

(a) Sampling point location; see Figure 2-2.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

ND - Not detected (number in parentheses is detection limit).

NC - Percent removal not calculated because the effluent concentration was greater than the influent concentration or the analyte was not detected in the influent sample.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Indicates a minimum level of removal.

**Table 4-10 (Continued)**

Analyte	Unit	Priority Pollutant Code	Average Influent to Treatment Concentration (SP-4) (a)	Influent to Treatment Concentration Range (SP-4) (a)	Average Effluent from Treatment Concentration (SP-6) (a)	Effluent from Treatment Concentration Range (SP-6) (a)	Percent Removal
Total Suspended Solids (TSS)	mg/L		1,150	860 - 1,560	<7.70	ND(5.00) - <18.5	99
<b>Total and Dissolved Metals</b>							
Aluminum, Total	ug/L		5,270	3,330 - 8,180	<25.1	ND(9.93) - 48.5	> 99
Barium, Total (e)	ug/L		53.1	29.0 - 76.0	5.36	4.40 - 6.00	90
Boron, Total	ug/L		373	287 - 496	348	317 - 400	6.6
Cadmium, Total	ug/L	P118	<1.02	ND(0.446) - 2.00	ND(0.446)	ND(0.446)	> 56
Calcium, Total (s)	ug/L		44,100	32,200 - 57,100	32,000	28,800 - 39,500	27
Chromium, Total	ug/L	P119	10.4	7.30 - 14.0	ND(1.68)	ND(1.68)	> 84
Cobalt, Total	ug/L		ND(0.914)	ND(0.914)	<0.923	ND(0.914) - <0.957	NC
Copper, Total (s)	ug/L	P120	1,170	755 - 1,580	18.3	15.0 - 27.7	98
Iron, Total	ug/L		1,160	694 - 1,670	176	156 - 208	85
Lead, Total (e)	ug/L	P122	19.4	14.2 - 26.0	ND(3.08)	ND(3.08)	> 84
Magnesium, Total (s)	ug/L		70,800	41,200 - 105,000	63,500	49,100 - 82,100	10
Manganese, Total (e)	ug/L		80.2	56.4 - 108	19.4	17.2 - 23.0	76
Mercury, Total (e) (s)	ug/L	P123	0.442	0.280 - 1.00	0.0340	0.0200 - 0.0550	92
Nickel, Total	ug/L	P124	27.6	20.9 - 46.0	14.3	11.5 - 20.0	48
Selenium, Total (s)	ug/L	P125	34.3	18.4 - 50.0	30.2	20.9 - 42.0	12
Silver, Total	ug/L	P126	<2.11	ND(1.28) - 3.00	ND(1.28)	ND(1.28)	> 40
Sodium, Total (s)	ug/L		492,000	281,000 - 792,000	533,000	413,000 - 664,000	NC
Thallium, Total	ug/L	P127	<0.00940	ND(0.00900) - 0.0100	<0.00910	ND(0.00900) - <0.00950	3.2
Tin, Total	ug/L		15.3	7.00 - 31.7	ND(3.45)	ND(3.45)	> 77

(a) Sampling point location; see Figure 2-2.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

ND - Not detected (number in parentheses is detection limit).

NC - Percent removal not calculated because the effluent concentration was greater than the influent concentration or the analyte was not detected in the influent sample.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Indicates a minimum level of removal.

**Table 4-10 (Continued)**

Analyte	Unit	Priority Pollutant Code	Average Influent to Treatment Concentration (SP-4) (a)	Influent to Treatment Concentration Range (SP-4) (a)	Average Effluent from Treatment Concentration (SP-6) (a)	Effluent from Treatment Concentration Range (SP-6) (a)	Percent Removal
Titanium, Total	ug/L		<2.59	ND(0.253) - 4.00	ND(0.253)	ND(0.253)	> 90
Vanadium, Total	ug/L		11.6	5.10 - 21.0	<0.900	ND(0.679) - 1.50	92
Zinc, Total (e) (s)	ug/L	P128	1,430	902 - 2,350	207	152 - 226	86
Aluminum, Dissolved	ug/L		116	96.5 - 130	<30.3	ND(9.93) - 53.7	74
Barium, Dissolved (e)	ug/L		4.48	2.80 - 6.00	5.48	4.50 - 6.50	NC
Boron, Dissolved	ug/L		<221	ND(3.37) - 442	<312	<169 - 388	NC
Calcium, Dissolved (s)	ug/L		27,200	20,200 - 37,800	32,200	28,800 - 37,900	NC
Cobalt, Dissolved (s)	ug/L		<6.58	ND(0.914) - 8.60	<1.39	ND(0.914) - 2.60	79
Copper, Dissolved (e) (s)	ug/L	P120	44.7	25.2 - 79.8	16.9	13.1 - 25.7	62
Iron, Dissolved (s)	ug/L		<88.7	ND(19.8) - 269	<85.8	ND(19.8) - 158	3.3
Magnesium, Dissolved (s)	ug/L		56,300	29,700 - 91,500	63,900	50,200 - 78,000	NC
Manganese, Dissolved (e) (s)	ug/L		22.0	13.1 - 28.6	21.8	19.4 - 23.8	1.2
Mercury, Dissolved (e) (s)	ug/L	P123	<0.0368	ND(0.0170) - 0.0700	<0.0252	ND(0.0170) - 0.0400	32
Nickel, Dissolved (s)	ug/L	P124	15.7	11.3 - 22.8	14.1	11.4 - 19.3	10
Selenium, Dissolved	ug/L	P125	29.8	22.6 - 42.9	41.2	28.4 - 72.1	NC
Sodium, Dissolved (s)	ug/L		464,000	269,000 - 821,000	619,000	406,000 - 990,000	NC
Vanadium, Dissolved	ug/L		ND(0.679)	ND(0.679)	<1.05	ND(0.679) - 1.90	NC
Zinc, Dissolved (e) (s)	ug/L	P128	100	83.4 - 119	205	151 - 223	NC

(a) Sampling point location; see Figure 2-2.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

ND - Not detected (number in parentheses is detection limit).

NC - Percent removal not calculated because the effluent concentration was greater than the influent concentration or the analyte was not detected in the influent sample.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Indicates a minimum level of removal.

**Table 4-10 (Continued)**

Analyte	Unit	Priority Pollutant Code	Average Influent to Treatment Concentration (SP-4) (a)	Influent to Treatment Concentration Range (SP-4) (a)	Average Effluent from Treatment Concentration (SP-6) (a)	Effluent from Treatment Concentration Range (SP-6) (a)	Percent Removal
<b>Volatile and Semivolatile Organics</b>							
Bis(2-ethylhexyl) Phthalate	ug/L	P066	31.9	22.2 - 58.1	<11.6	ND(10.0) - <14.5	64
Methylene Chloride	ug/L	P044	<10.1	ND(10.0) - 10.5	ND(10.0)	ND(10.0)	> 0.99
Phenol (s)	ug/L	P065	149	111 - 244	81.4	64.9 - 109	45
Tetrachloroethene	ug/L	P085	<17.8	ND(10.0) - 29.2	ND(10.0)	ND(10.0)	> 44
Toluene	ug/L	P086	<10.1	ND(10.0) - 10.7	ND(10.0)	ND(10.0)	> 1.4

(a) Sampling point location; see Figure 2-2.

(e) Analyte detected at some level in the equipment blank. See Section 5.2.2 and Table 5-2 for equipment blank results.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

ND - Not detected (number in parentheses is detection limit).

NC - Percent removal not calculated because the effluent concentration was greater than the influent concentration or the analyte was not detected in the influent sample.

< - Average result includes at least one nondetect value (calculation uses detection limits for nondetected results).

> - Indicates a minimum level of removal.

**Table 4-11**

**Treatment System Residual and Incinerator Ash Analytical Results, Island Princess**

Analytical results for one-time grab samples of treatment system residual (i.e., screening solids and excess biological mass from bioreactors) and incinerator ash for analytes detected at least once in these samples. See Appendix A-2 for all analytical results (detected and nondetected). Figure 2-2 identifies the sampling point locations; see Table 3-2 for sample collection methodology. Also shown are average concentrations for the influent to treatment samples (from Table 4-6) for comparison. Certain screening solids results were converted from mass to volume units; see Section 3.3. Priority pollutants (designated by EPA in 40 CRF Part 423, Appendix A) are identified where applicable.

Analyte	Priority Pollutant Code	Screening Solids (SP-11) (a) Day 3	Biosludge (SP-12) (a) Day 1	Incinerator Ash (SP-13) (a) Day 3	Average Influent to Treatment (SP-4) (a)
<b>Classical Pollutants</b>					
Alkalinity		892 mg/L	810 mg/L	NC	396 mg/L
Ammonia As Nitrogen (NH <sub>3</sub> -N) (s)		318 mg/L	40.1 mg/L	NC	94.2 mg/L
Chemical Oxygen Demand (COD)		124,000 mg/L	14,400 mg/L	NC	956 mg/L
Chloride		933 mg/L	1,120 mg/L	NC	938 mg/L
Hardness (s)		NC	1,640 mg/L	NC	402 mg/L
Nitrate/Nitrite (NO <sub>2</sub> -N+ NO <sub>3</sub> -N)		1.35 mg/L	0.240 mg/L	NC	<0.0620 mg/L
Sulfate		1,320 mg/L	163 mg/L	NC	134 mg/L
Total Dissolved Solids (TDS)		NC	1,280 mg/L	NC	1,850 mg/L
Total Kjeldahl Nitrogen (TKN) (s)		1,740 mg/L	561 mg/L	NC	181 mg/L
Total Organic Carbon (TOC)		151,000 mg/L	2,730 mg/L	NC	140 mg/L
Total Phosphorus		930 mg/L	173 mg/L	NC	28.3 mg/L
Total Suspended Solids (TSS)		NC	15,800 mg/L	NC	1,150 mg/L
<b>Total Metals</b>					
Aluminum, Total		266,000 ug/L	120,000 ug/L	67,100 mg/kg	5,270 ug/L
Antimony, Total	P114	ND(201) ug/L	74.0 ug/L	7.50 mg/kg	ND(5.97) ug/L
Arsenic, Total	P115	ND(198) ug/L	12.0 ug/L	1.40 mg/kg	ND(2.32) ug/L
Barium, Total		3,730 ug/L	1,790 ug/L	381 mg/kg	53.1 ug/L
Beryllium, Total	P117	ND(11.7) ug/L	1.00 ug/L	0.510 mg/kg	ND(0.00540) ug/L

(a) Sampling point location; see Figure 2-2.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

NC - Not collected.

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetected value (calculation uses detection limits for nondetected results).

**Table 4-11 (Continued)**

Analyte	Priority Pollutant Code	Screening Solids (SP-11) (a) Day 3	Biosludge (SP-12) (a) Day 1	Incinerator Ash (SP-13) (a) Day 3	Average Influent to Treatment (SP-4) (a)
Boron, Total		ND(457) ug/L	858 ug/L	107 mg/kg	373 ug/L
Cadmium, Total	P118	88.5 ug/L	25.0 ug/L	0.500 mg/kg	<1.02 ug/L
Calcium, Total (s)		1,750,000 ug/L	316,000 ug/L	257,000 mg/kg	44,100 ug/L
Chromium, Total	P119	1,490 ug/L	282 ug/L	87.1 mg/kg	10.4 ug/L
Cobalt, Total		ND(23.3) ug/L	26.0 ug/L	8.90 mg/kg	ND(0.914) ug/L
Copper, Total (s)	P120	64,800 ug/L	21,400 ug/L	1,290 mg/kg	1,170 ug/L
Iron, Total		123,000 ug/L	20,500 ug/L	11,500 mg/kg	1,160 ug/L
Lead, Total	P122	ND(106) ug/L	319 ug/L	18.9 mg/kg	19.4 ug/L
Magnesium, Total (s)		834,000 ug/L	206,000 ug/L	10,100 mg/kg	70,800 ug/L
Manganese, Total		6,380 ug/L	1,750 ug/L	542 mg/kg	80.2 ug/L
Mercury, Total (s)	P123	ND(1.86) ug/L	ND(0.0170) ug/L	ND(0.00400) mg/kg	0.442 ug/L
Molybdenum, Total		ND(55.9) ug/L	95.0 ug/L	10.1 mg/kg	ND(1.50) ug/L
Nickel, Total	P124	1.35,000 ug/L	310 ug/L	37.1 mg/kg	27.6 ug/L
Selenium, Total (s)	P125	513 ug/L	69.0 ug/L	ND(0.0291) mg/kg	34.3 ug/L
Silver, Total	P126	350 ug/L	52.0 ug/L	9.70 mg/kg	<2.11 ug/L
Sodium, Total (s)		951,000 ug/L	697,000 ug/L	14,300 mg/kg	492,000 ug/L
Thallium, Total	P127	ND(1.17) ug/L	ND(0.00900) ug/L	ND(0.00250) mg/kg	<0.00940 ug/L
Tin, Total		ND(231) ug/L	77.0 ug/L	58.4 mg/kg	15.3 ug/L
Titanium, Total		1,300 ug/L	5.00 ug/L	1,890 mg/kg	<2.59 ug/L
Vanadium, Total		1,170 ug/L	272 ug/L	29.9 mg/kg	11.6 ug/L
Yttrium, Total		ND(11.7) ug/L	6.00 ug/L	3.40 mg/kg	ND(0.222) ug/L
Zinc, Total (s)	P128	90,400 ug/L	31,000 ug/L	1,470 mg/kg	1,430 ug/L
<b>Volatile and Semivolatile Organics</b>					
Bis(2-ethylhexyl) Phthalate	P066	18,500 ug/L	NC	17,600 ug/kg	31.9 ug/L
Bromomethane	P046	36.7 ug/L	ND(10.0) ug/L	NC	ND(10.0) ug/L

(a) Sampling point location; see Figure 2-2.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

NC - Not collected.

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetected value (calculation uses detection limits for nondetected results).

**Table 4-11 (Continued)**

Analyte	Priority Pollutant Code	Screening Solids (SP-11) (a) Day 3	Biosludge (SP-12) (a) Day 1	Incinerator Ash (SP-13) (a) Day 3	Average Influent to Treatment (SP-4) (a)
Chloroform	P023	ND(5.04) ug/L	ND(10.0) ug/L	NC	ND(10.0) ug/L
Methylene Chloride	P044	ND(5.04) ug/L	ND(10.0) ug/L	NC	<10.1 ug/L
Phenol (s)	P065	822 ug/L	NC	976 ug/kg	149 ug/L
Tetrachloroethene	P085	12.0 ug/L	14.8 ug/L	NC	<17.8 ug/L
Toluene	P086	68.5 ug/L	ND(10.0) ug/L	NC	<10.1 ug/L
<b>Dioxins and Furans</b>					
1,2,3,4,6,7,8-HpCDD		NC	NC	92.9 pg/g	NC
1,2,3,4,6,7,8-HpCDF		NC	NC	292 pg/g	NC
1,2,3,4,7,8,9-HpCDF		NC	NC	31.6 pg/g	NC
1,2,3,4,7,8-HxCDD		NC	NC	12.4 pg/g	NC
1,2,3,4,7,8-HxCDF		NC	NC	92.5 pg/g	NC
1,2,3,6,7,8-HxCDD		NC	NC	22.4 pg/g	NC
1,2,3,6,7,8-HxCDF		NC	NC	104 pg/g	NC
1,2,3,7,8,9-HxCDD		NC	NC	41.0 pg/g	NC
1,2,3,7,8,9-HxCDF		NC	NC	7.30 pg/g	NC
1,2,3,7,8-PeCDD		NC	NC	20.9 pg/g	NC
1,2,3,7,8-PeCDF		NC	NC	108 pg/g	NC
2,3,4,6,7,8-HxCDF		NC	NC	118 pg/g	NC
2,3,4,7,8-PeCDF		NC	NC	129 pg/g	NC
2,3,7,8-TCDF		NC	NC	136 pg/g	NC
Octachlorodibenzo-p-dioxin		NC	NC	101 pg/g	NC
Octachlorodibenzofuran		NC	NC	76.1 pg/g	NC

(a) Sampling point location; see Figure 2-2.

(s) Analyte detected at some level in the source water. See Section 4.1.7 and Table 4-12 for source water results.

NC - Not collected.

ND - Not detected (number in parentheses is detection limit).

< - Average result includes at least one nondetected value (calculation uses detection limits for nondetected results).

**Table 4-12**

**Source Water Analytical Results, Island Princess**

Analytical results for one-time grab sample of source water for detected analytes. See Appendix A-2 for all analytical results (detected and nondetected). Also shown are Federal drinking water standards for comparison. Priority pollutants (designated by EPA in 30 CFR Part 423, Appendix A) are identified where applicable.

Analyte	Unit	Priority Pollutant Code	Source Water (SP-14) (a)	Federal Drinking Water Standards (b)
<b>Classical Pollutants</b>				
Ammonia As Nitrogen (NH <sub>3</sub> -N)	mg/L		0.0350	
Hardness	mg/L		16.9	
Total Kjeldahl Nitrogen (TKN)	mg/L		0.300	
<b>Total and Dissolved Metals</b>				
Calcium, Total	ug/L		6,470	
Copper, Total	ug/L	P120	412	1,300
Magnesium, Total	ug/L		191	
Mercury, Total	ug/L	P123	0.100	2.0
Selenium, Total	ug/L	P125	0.970	50
Sodium, Total	ug/L		2,110	
Zinc, Total	ug/L	P128	23.0	5,000
Calcium, Dissolved	ug/L		6,450	
Cobalt, Dissolved	ug/L		1.20	
Copper, Dissolved	ug/L	P120	479	
Iron, Dissolved	ug/L		27.9	
Magnesium, Dissolved	ug/L		197	
Manganese, Dissolved	ug/L		2.40	
Mercury, Dissolved	ug/L	P123	0.0800	
Nickel, Dissolved	ug/L	P124	2.80	
Sodium, Dissolved	ug/L		2,100	
Yttrium, Dissolved	ug/L		2.00	
Zinc, Dissolved	ug/L	P128	33.0	
<b>Volatile and Semivolatile Organics</b>				
Phenol	ug/L	P065	53.0	

(a) Sampling point number; see Table 2-1.

(b) 40 CFR 141.62 National Primary Maximum Contaminant Levels for Inorganic Contaminants (mercury, selenium); 40 CFR 141.51 National Primary Maximum Contaminant Level Goals for Inorganic Contaminants (copper); and 40 CFR 143.3 Secondary Maximum Contaminant Levels (zinc).

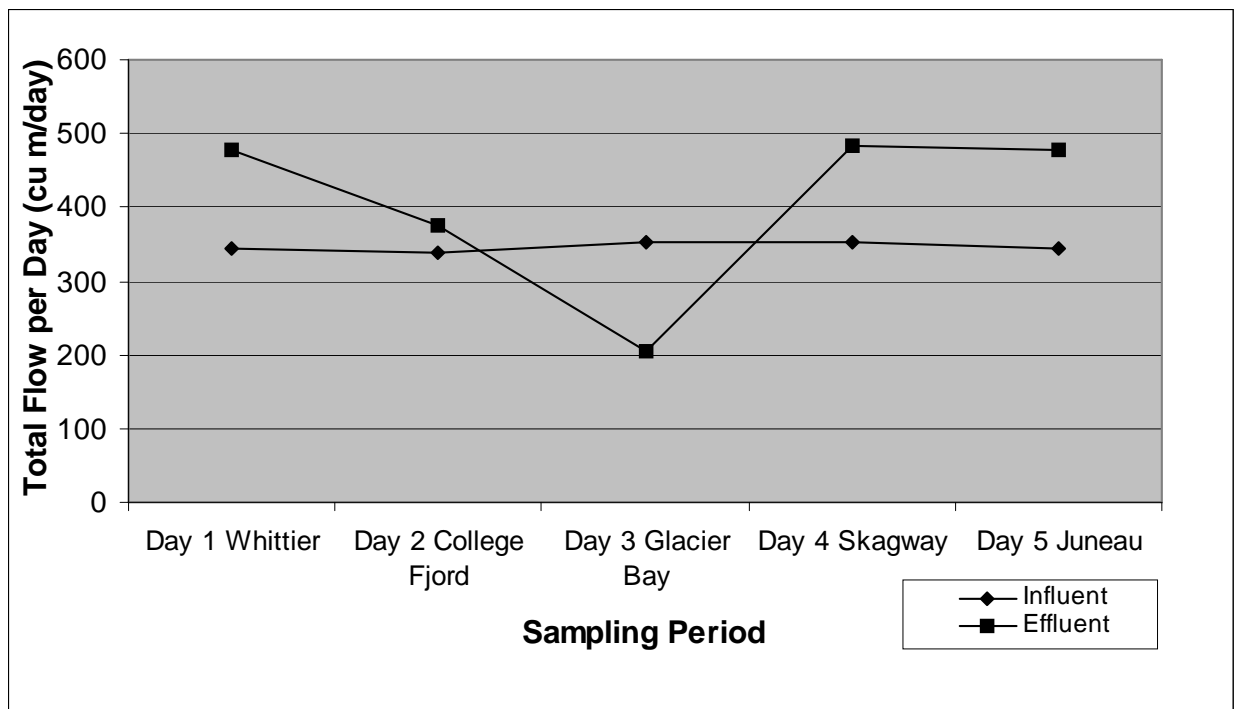
**Table 4-13****Flow Data by Sampling Period, Island Princess**

Flow data collected via strap-on ultrasonic flow meters installed by the sampling team. Figures 2-1 and 2-2 show the flow meter locations. Note that the treatment system treats only accommodations wastewater and sewage. Flow per capita was calculated by dividing daily flow totals by the number of passengers and crew (2,925 people) onboard the Island during the sampling episode.

Sampling Period	Effluent from Treatment System (SP-6) (a)	
	Daily Total Flow, gallons/day (m <sup>3</sup> /day)	Daily Flow Per Capita, gallons/day/person (m <sup>3</sup> /person)
Day 1	126,000 (477)	43.1 (0.163)
Day 2	99,300 (376)	34.0 (0.129)
Day 3	53,900 (204) (b)	18.4 (0.070) (b)
Day 4	127,000 (482)	43.5 (0.165)
Day 5	126,000 (477)	43.0 (0.163)
Average (b)	120,000 (453) (b)	40.9 (0.155) (b)

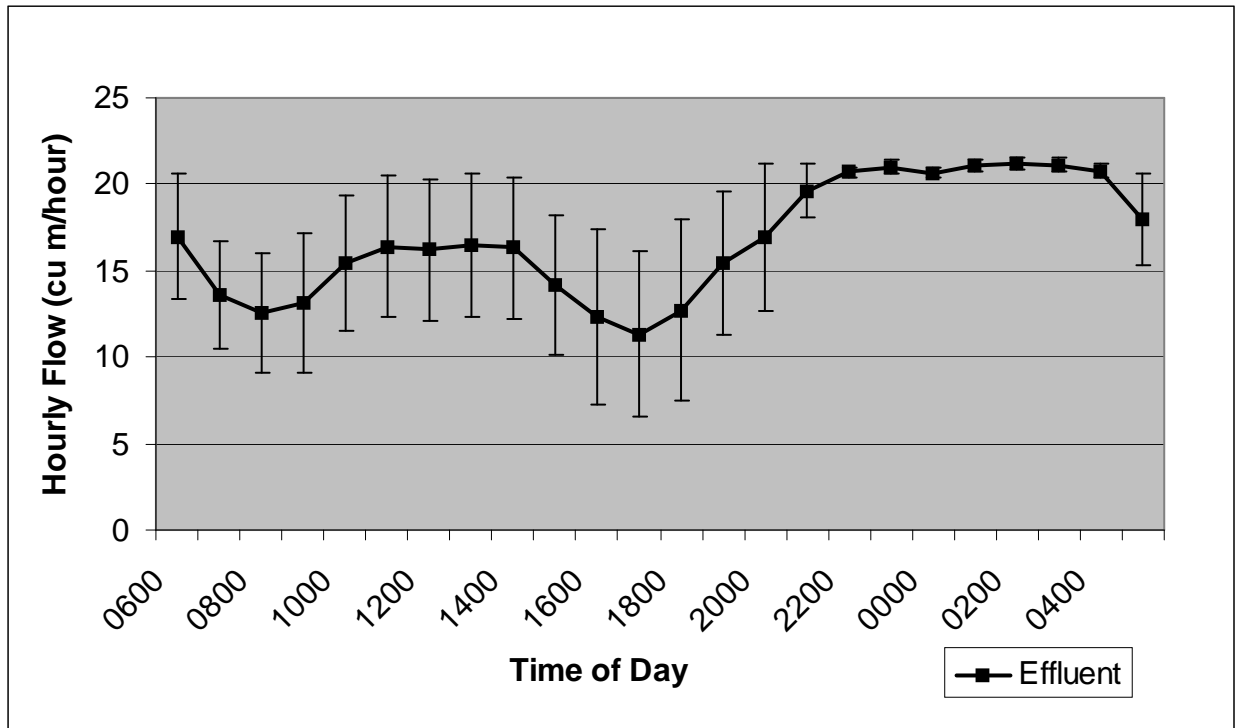
(a) Sampling point location; see Figures 2-1 and 2-2.

(b) Average daily discharge flow rate for effluent from treatment system excludes data for Day 3 when the Island discontinued discharge while it cruised Glacier Bay National Park.



**Figure 4-1. Total Daily Flow, Island Princess**

Flow data collected via strap-on ultrasonic flow meters installed by the sampling team. Flow data are presented as daily totals for each location. Figures 2-1 and 2-2 show the flow meter locations. Note that the treatment treats only accommodations wastewater and sewage.



**Figure 4-2. Average Hourly Wastewater Treatment System Flow, Island Princess**

Average effluent flow for each hour interval over the five consecutive 24-hour sampling periods, calculated and plotted from the strap-on flow meters installed by the sampling team. Figure 2-2 shows the flow meter location. Bars represent the standard error of the hourly flow calculated for the five consecutive sampling days. Standards error is calculated as the standard deviation divided by the square root of the number of hourly flow measurements (five).